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# Suggested Production Goals for Farm Enterprises in Louisiana.

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SUGGESTED PRODUCTION GOALS FOR FARM  
ENTERPRISES IN LOUISIANA

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The Department of Agricultural Education

by  
Thomas Jackson Stanly  
B. S., Louisiana State University, 1947  
M. S., Louisiana State University, 1948  
January, 1956

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## ABSTRACT

This study is concerned with establishing suggested production goals for farm enterprises studied in vocational agriculture. The scope of this problem is delimited geographically to the State of Louisiana. It includes twenty-one of the top twenty-five farm enterprises in the state based on contribution to farm income.

In the treatment of data concerning this problem, goals, aims, and purposes are used interchangeably. For the purpose of determining production goals in this study, the following five points are developed: the relationship between goals and the learning process, the factors concerning the production of a farm product which are indicative of efficiency of production, the current efficiency standards of these efficiency factors, suggested production goals, and the approved practices recommended for the attainment of production goals.

The efficiency factors, efficiency standards, production goals, and selection of the most important approved practices were established by specialists of the Division of Agricultural Extension at Louisiana State University.

The efficiency standards and production goals established by these specialists are studied estimates. The approved practices most important to the accomplishment of the production goals were also selected by these men.



The approved practices that are generally carried out by the majority of farmers are not included in this problem.

In this study, the portion treating the establishment of efficiency factors, efficiency standards, and production goals did not lend itself to summarization. Therefore, the summarizing and concluding statements deal primarily with purposes and uses of production goals in teaching and studying vocational agriculture.

It was concluded that the changing nature of our civilization is constant. As a result, our educational system must prepare the student for adjustment in a modifying environment. For our educational system to be successful in this effort, its activities must be in accord with worthwhile goals. Furthermore, goals supplement the learning process. Goals are better adapted for use by the teacher and student when stated in terms of student accomplishment. Interests of the student are stimulated by the use of goals. Use of production goals in connection with the student's farming program will increase the effectiveness of the program as an aid to learning. In addition, this use of production goals will provide a means of evaluation of the learning activities of the student.

The production goals presented in this study were based on the point of highest profit combination. Each

goal was established on a statewide basis, except where the production of the product was distributed throughout the state resulting in a significant difference of production per acre due to varying soil types. In these instances, the state was divided into soil type areas which were treated individually. These production goals are intended to serve only as guides for setting up individual goals for farm enterprises included in the student's farming program. The availability of suggested production goals will increase their use in teaching vocational agriculture. As a result, instruction in vocational agriculture will be made more effective.

## CHAPTER I

### INTRODUCTION

Should one of our goals in education be adaptation to change? Is change normal? Are setting and striving toward goals necessary to making adjustments to meet changing times if change is constant? We ask ourselves these questions in order to determine which goals to work toward in educating the populace of this nation.

Generally, it is accepted that civilizations are characterized by continuous change - some more so than others. Our civilization in the United States has been, is now, and has prospects of continuing to be one of the world's dominating nerve centers of this phenomenon we call change. A major reason for this position of leadership among world powers is the ability of the United States to produce at a high level of efficiency. This ability in turn provides a powerful national defense and a comparatively high standard of living.

What physical, social, or spiritual influence gets credit for this favorable position of our nation in its relation to others in the world? The average person agrees that a combination of a number of influences is responsible for our position, some being felt to a greater extent than others.

One of the major propelling forces behind our

technological advance has been the quality of the finished product of our educational system. This system has provided educational opportunity for all citizens, compulsory education, vocational education, specialization, and many other innovations in the business of education. Some authorities contend that we have innovated in our educational program to a dangerous extreme. It has been observed by other authorities that the degree to which we have changed our educational system is not as important as the results which these changes have obtained. These results are most readily observed in the process of production.

Agriculture, the field in which this study is being made, is one of the best examples of dynamics of production in a particular industry. When one considers the size of the agricultural industry and the number of people under its influence, the far reaching effects of these technical changes in this industry become obvious. The teaching and research in our schools are responsible for many of these developments and the dissemination of information concerning many other changes. These changes have affected agriculture as an industry in such ways as what is produced, how much is produced, and the instruments of production - particularly the people.

The objective of agricultural production has changed from subsistence in colonial agriculture to the supply of specialized markets of today. There is little subsistence

farming in our present agricultural economy. We seem to be headed toward an age of specialization of production in the agricultural industry just as rapidly as other industries are headed toward specialization of production. The truck crop farmer attempts to provide a certain product for a particular market at a given time. The livestock producer specializes in a particular animal to reach the market at a certain time in a given condition. From the profits of their specialized production, they will buy their needs of life.

How much each farmer will produce has been significantly altered by changes within the agricultural industry. At one time the amount produced by the farmer was determined by the size of his family and what was needed in order to barter for what he was unable to produce. Currently, as a result of the development of domestic and foreign markets, the farmer may produce as much of his specialized crop as these new markets demand. In some instances where there is not a stable demand for a product through these new markets, and its production is deemed necessary by political economic planners, the government has even provided a market for the product. Technological advances have enabled the farmer to produce beyond his individual needs.

Man, as an instrument of production, has been affected most, when compared to other components of the production process. His living and working conditions have

been drastically changed. At the time that this country won its independence, more than eighty per cent of the nation's population was located on farms. Now the situation has been practically reversed, the majority of people having migrated from the farms to urban dwellings. The grand exodus from farms was the natural result of an over supply of farm labor. The over supply of farm labor resulted from the introduction of farm machinery into the production process of farm products and the increase in number of total outputs per unit of input.

This shifting of population, brought about by technological advances, has changed the condition of the remaining farmers to a great extent. The realm of responsibility of the farmer has increased to wider bounds. The farmer of today is charged with the obligation of providing food for himself and approximately twenty other people. This ratio will increase in the future if current population trends do not change. The farmer of today is also responsible for the conservation of more of our nation's soil resources than were his forefathers. In addition to the responsibility of feeding more people and the greater responsibility of conserving our natural resources, he occupies a role of ever increasing importance as a consumer in our national economy.

Consider the above statements concerning the scope of the responsibility of the farmer. These men, as all men,

need goals to work toward in their labor if they are to reach the high level of production set for them by the nature of the economic society in which they now find themselves.

Since goals are so important to man's development of interests, ideals, knowledge, habits, and character, our educational system should provide the student with experiences that will cause him to continuously move toward set goals. While in school, the student should be assisted in developing worthwhile goals and be provided with a means of acquiring the knowledge required to accomplish those goals. Considering the farmer's ever increasing position of responsibility in our society, these goals should be continuously changed to meet these new conditions. This is the school's responsibility to the farmer in its capacity of training prospective farmers in the departments of vocational agriculture.

The use of production goals in teaching and studying vocational agriculture will increase its effectiveness in meeting the needs of prospective farmers in our changing civilization. These production goals may also serve as an indicator of the degree to which the farmer is fulfilling his personal obligation to his economic society - that obligation of efficient production.

#### STATEMENT OF THE PROBLEM

This study is concerned with establishing suggested

production goals for farm enterprises studied in vocational agriculture.

#### Problem Analysis

1. What is the relationship between goals and the learning process?
2. What factors concerning the production of a farm product are indicative of the efficiency of production?
3. What are the current efficiency standards of the listed efficiency factors of various farm enterprises in the state?
4. What are the suggested production goals of various farm enterprises in the state?
5. What are the approved practices recommended for attainment of production goals?
6. Conclusions and recommendations.

#### DELIMITATION

In geographic area, this study is limited to the State of Louisiana.

The majority of the farm enterprises treated herein have been considered on a statewide basis. In some cases where the production of a farm product was found to be distributed over the state and the different soil types significantly influenced the production, the state was divided into production areas.

The basis used for selection of the farm enterprises



included in this study was the rank<sup>1</sup> of the enterprise in contribution to farm income to the farmers of the State of Louisiana except where unusual conditions prevailed. These conditions were extreme localization of production or the nature of the product. The twenty-one enterprises dealt with in this study were among the top twenty-five in the state.

#### PURPOSE OF THE STUDY

This study provides suggested production goals for farm enterprises which may be used by anyone attempting to teach or study a farm enterprise in this state.

After personal interviews with Dr. R. L. Davenport, Director of the School of Vocational Education, Louisiana State University, Dr. J. C. Floyd, Head of the Department of Agricultural Education, Louisiana State University, and Dr. J. Norman Efferson, Director of the Louisiana Agricultural Experiment Station, the writer has concluded that having available suggested production goals would stimulate their use by teachers and students in teaching and studying, respectively, the farm enterprises included in the farming program of each student. According to the ideas of these men, the use of production goals would aid in the learning

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<sup>1</sup>J. P. Montgomery, "Agricultural Statistics for Louisiana, 1909-1953," Louisiana Bulletin No. 490, Agricultural Experiment Station, Louisiana State University, Baton Rouge, Louisiana, May, 1954, p. 16.

process in that goals would provide a purpose from which interests are derived. Interest is a major factor in the viability of vocational education. Without interest, there is no attention. Without attention, there is no learning. Further, these leaders in agricultural education and research recognize the necessity of goals in teaching and learning in all fields of study as well as in the field of vocational agriculture. The writer believes that the effectiveness of instruction in agriculture can be increased through use of production goals.

#### DEFINITION OF TERMS

The general terms used in this study and their definitions are as follows:

##### Efficiency Factors:

Efficiency factors are those elements in the conduct of an enterprise which are known to limit the rate or economy of production and the returns from the enterprise. It is necessary here to place emphasis upon those factors which can be objectively measured.<sup>2</sup>

##### Efficiency Standards:

An efficiency standard is an empirically determined rate of production--a definite statement of time, quality, quantity, or proportion which either sets a maximum or minimum limit or establishes a desired median for an efficiency factor.<sup>3</sup>

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<sup>2</sup>Norman K. Hoover and Henry S. Brunner, "Production Goals for Livestock Enterprise Projects in Vocational Agriculture," Pennsylvania Agricultural Experimental Station Bulletin No. 527, State College, Pennsylvania.

<sup>3</sup>Loc. cit.

### Production Goals:

Production goals are the particular standard set by an individual student for each efficiency factor which is considered to be applicable to a specific enterprise to be conducted under anticipated conditions. They should be realistically determined according to past performances under similar conditions on the farms and set as high as an estimate of probable achievement will allow.<sup>4</sup>

### Productive Project:

A productive project is a business venture for experience and profit which as a minimum usually occurs in a period of time represented by a production cycle of farm enterprises.<sup>5</sup>

### Supervised Farming:

Supervised farming includes all the activities in farming, conducted by students individually or in groups, which have educative value and for which a department of vocational agriculture assumes responsibility for providing organized instruction and supervision.<sup>6</sup>

### Farm Enterprise:

A farm enterprise consists of a series of jobs in the production and disposal of a farm commodity, together with by-products, if any.<sup>7</sup>

### SOURCE OF DATA

The data for this study were collected from a number

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<sup>4</sup>Loc. cit.

<sup>5</sup>George P. Deyoe, Supervised Farming in Vocational Agriculture (Danville, Illinois: Interstate, 1943), p. 54.

<sup>6</sup>Loc. cit.

<sup>7</sup>"Analysis of the Operative Jobs of a Connecticut Growing Enterprise," Vocational Education Bulletin No. 118, U. S. Government Printing Office, Washington D. C., p. 3.

of different sources. The information relating the use of production goals to the learning process was taken from an extensive review of books, periodicals, bulletins, unpublished statements, and other printed matter dealing with the subject.

The data providing the efficiency factors, efficiency standards, production goals, and approved practices were collected from many federal, state, institutional, and individual publications, specialists' statements, records, and unpublished materials. A complete listing of the sources will be found in the bibliography.

The three divisions of the College of Agriculture of Louisiana State University--the Resident Teaching, Agricultural Extension, and Experiment Station--were the major agencies used as sources of data.

### HYPOTHESES

1. Goals are a necessary supplement to the learning process.
2. Setting up goals in terms of expected student accomplishment is important to effective instruction.
3. Use of production goals by the teacher of vocational agriculture for the enterprises included in the student's farming program will provide a greater incentive for effective teaching and learning.

## PROCEDURE

According to recognized authorities in the field of Vocational Agricultural Education, the proper use of production goals in teaching vocational agriculture aids the student in the learning process. The use of these goals by the teacher and student depends largely on the availability of calculated goals and an understanding of the proper use of them as a technique in the learning and teaching processes. Since no visible effort has been made before to establish production goals for farm enterprises to be used in instruction of vocational agriculture on a statewide basis, the writer has selected this problem as the subject of this study. It is the writer's expectation that this study will contribute to the effectiveness of instruction in vocational agriculture in Louisiana.

A review of literature was made concerning the following points pertaining to production goals: the relation of goals to the learning process, the relation of goals to vocational education in agriculture, and the relation of production goals to the learning process in vocational agriculture. This review was made from books, periodicals, and unpublished statements by authorities. The material related to this study is presented in Chapter II in the form of direct quotations or summarizations by the writer.

After a review of literature related to farm enterprises included in this study, the writer found no established

production goals for the State of Louisiana in existence. The writer then turned to various specialists as sources of information and authority to establish efficiency factors, efficiency standards, and production goals. The specialists of the Division of Agricultural Extension at Louisiana State University were selected as this authority where possible. This selection was based on the idea that these men, by the nature of their positions, were in close touch with statewide production and problems of production of farm products.

The required information was collected from these specialists during personal interviews with the writer. After this information was compiled, it was submitted to the specialists for examination, after which indicated changes were made.

#### ECONOMIC ASPECTS OF PROBLEM

Production goals, as used in this study, are goals set by a student to differentiate among various levels of production. The level of production indicated by the student's goal does not necessarily indicate the maximum production potential for the farm enterprise, but rather the level of production that will yield the greatest net profit.

The suggested production goals set up in this study will not be the same as the goal for highest profit combination for each farm. They will however represent the point of highest profit combination for the average farm in the

area of production which is indicated.

The chief variable factor in the use of production goals is the variation of weather conditions.

In the use of the production goals by a teacher or student, it will be his responsibility to adapt each suggested area or state goal to the individual farming situation. The author of this study recognizes that a production goal for a particular farm enterprise will seldom be the same in any two situations. Many factors of production enter into establishing such an individual goal. Therefore, it is repeated that the suggested goals in this study are presented only as guides to be used in establishing goals on a particular farm.

#### TREATMENT OF DATA

The data concerned with the relation of goals to the learning process, the establishment of efficiency factors, efficiency standards, production goals, and selection of the approved practices most important in accomplishing these goals were collected, tabulated, analyzed, and presented in this study in a supporting manner.

The relationship of goals to the learning process was investigated in the review of literature. The findings of this investigation are presented in Chapter II. In the majority of cases, selected portions of the reviewed material pertaining to the relation between goals and the learning process are quoted exactly or in part. This chapter is

divided into four parts: (I) Introduction, (II) The Relation of Goals to the Learning Process, (III) The Relation of Goals to Vocational Education in Agriculture, and (IV) The Relation of Production Goals to Learning in Vocational Agriculture.

Chapter III deals with the presentation of the efficiency factors, efficiency standards, production goals, and the approved practices recommended for the attainment of these goals for all enterprises included in this study. Each farm enterprise is dealt with separately. The efficiency factors, efficiency standards and production goals are presented by the use of a table in which the sources are indicated. The approved practices recommended for attainment of production goals of each enterprise are placed after each table. The authorities determining these practices are indicated and the practice itself is quoted directly from the indicated source.

The summary, conclusions, and recommendations are treated in Chapter IV. Appendix "A" contains the schedule used by the writer in collecting data from specialists during interviews.



## CHAPTER II

### REVIEW OF RELATED INFORMATION

#### I. Introduction

The purpose of reviewing related information concerning this study was to determine whether conclusive work had been done on this subject previously and search out leading ideas to be used in formulating this problem. The writer was also interested in finding information concerning the best methods of research to be used in solving this problem and locating similar data to be used in the interpretation of the results, along with providing the reader with what the writer thought was the most enlightening material previously done on the subject of this study.

The material presented in this chapter, arranged in logical sequence, is expected to lead the reader in his thinking after acquaintance with the problem in the first chapter, to the major purpose of this study -- that of suggesting production goals for farm enterprises. This material was selected after an extensive survey by the writer because it expresses best the stated purpose of the review of literature.

The second section of this chapter illustrates the significance of goals in life. In following up that line of reasoning, the necessity of goals in our educational system is pointed out.

After the reader's attention has been directed to the significance of goals in the above general relationships, the third section of this chapter is developed to guide his thinking to a more specific use of goals in teaching and studying vocational agriculture.

The fourth section of this chapter points out, what in the opinion of the writer, is the best thinking of present day authorities concerning the need, development, and use of production goals in teaching and studying vocational agriculture.

After a review of the related literature included here, one should be familiar with what has been done previously by others on studies of this type. He should also have the background necessary for consideration of the production goals presented in this study.

In the majority of the following discussions the terms goals, aims, objectives, and purposes are consistently used synonymously. The writer recognizes that some authorities define these terms individually in their use. However, in this review of literature, the various authors' undelineated use of these terms has caused the writer to ignore any distinction among them.

## II. The Relationship of Goals to the Learning Process

Even the more thoughtful of human beings seldom appear to have found any "anchor for a drifting world" or to have very clearly defined any ultimate goal toward which to shape their action. Yet it would seem altogether impossible

to construct an intelligent plan of individual action or a scheme of education until some such fundamental objective has been formulated and accepted. The formulation of an ultimate educational objective for oneself is not, as has been frequently supposed, a subject solely for the amusement of speculative philosophers.

All are substantially agreed that the school is merely one of many agencies for facilitating and improving the social process. Hence the inquiry comes down to this: What is this whole social process for? Unfortunately this simplification does not make the answer evident. When we think philosophically, we trust to the reasonableness of our ideas to gain them acceptance. In imagination we perch upon some lofty eminence whence we can see in perspective, with our mind's eye, the wave of civilization sweeping from the Orient westward, and we attempt to predict the future and guess the ultimate objectives of the human race.

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What is the social process for? The behavior and thought of every individual in the world is witness to the truth of this conclusion: The social process is to satisfy human wants, desires, or purposes----to achieve happiness.<sup>8</sup>

McCall's above statement has to do with the relation of purposes and goals to living. He points out that happiness is the objective of the process of socialization.

Cronback relates goals to everyday living in following paragraphs.

Living should be more than vegetating, waiting for crises that demand adjustment. Satisfaction comes to different people in different ways, but rich living involves striving for and making progress toward personal goals. Some people find their accomplishment in helping others (as in teaching

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<sup>8</sup>William A. McCall, Measurement (New York: The Macmillan Co., 1939), pp. 1-2.

or home-making); some find it in designing houses or building up a business.

Life is barren unless one has something to work for. Boredom and depression are frequent companions of one who lacks personal goals and interests. If his momentary problems are solved, he has nothing to do with himself. When faced with major personal decisions or difficulties, he has no answer to the question, "Why am I doing all this anyway?"

A sense of direction and enthusiastic concern for some larger ends stabilizes one's life. It gives impetus and interest to daily activities and keeps one going when difficulties are encountered. Goals and interests are learned in many ways.<sup>9</sup>

Cronback defines goals and discusses their relation to each other as follows:

The goal of the learner is some consequence which he wishes to attain. This target may be defined in terms of some object to be obtained, some response desired from another person, or some internal feeling such as the enjoyment of an entertaining show. The person has many goals at the same time, and usually thinks of some immediate goal (such as completing an assigned task) as related to a whole series of future goals (such as earning a respectable grade in the course, finishing school, and succeeding in a career). Goals direct the effort of the learner.<sup>10</sup>

The following is an account by Lindquist dealing with ultimate and immediate objectives of instruction. He further comments on their relation to the method of curriculum organization in our schools today. In this discussion

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<sup>9</sup>Lee J. Cronback, Educational Psychology (New York and Chicago: Harcourt, Brace and Company, 1954), p. 36.

<sup>10</sup>Ibid. p. 50.

the writer is accepting the word objective as being synonymous with goals in most instances.

Many of the basic objectives of school instruction cannot possibly be fully realized until long after the instruction has been concluded. For guidance in specific courses of instruction, however, it is common practice to set up less remote objectives--objectives which are capable of immediate attainment. Ideally, these immediate objectives should in every instance have been clearly and logically derived from accepted ultimate objectives, in full consideration of all relevant characteristics of the pupils who are to receive the instruction. Ideally, also, the immediate objectives should be supported by dependable empirical evidence that their attainment will eventually lead to or make possible the realization of the ultimate objectives. Finally, the content and methods of instruction should, ideally, be logically selected, devised, and used with specific reference to these immediate and ultimate objectives, and should likewise be supported by convincing experimental evidence of their validity.

Unfortunately, this ideal relationship among ultimate objectives, immediate objectives, and the content and methods of instruction has only rarely been approximated in actual practice. Some of the content of current instruction, if derived at all from sound and accepted ultimate objectives, has been derived from them by a process of faulty inference, and contributes much less to the realization of the objectives than other content which could be substituted for it. More unfortunately, a portion of the present content of school instruction is there only by reason of the organization of the curriculum by "subjects", and because of the practice of introducing new materials in intact subject units, or subject by subject, often without any careful selection of the detailed content of those subjects. As a result of this practice many detailed elements which have no relationship whatever to any ultimate objectives have entered the curriculum simply because they "belonged" in the same broad category of knowledge, or in the same subject, with other content which could be readily justified, and because of which the subject as a whole was selected.

. . . . .

The foregoing is not intended as a general indictment of the practice of organizing the curriculum by subjects. The practice clearly has its advantages as well as disadvantages, and many of its undesirable features could be eliminated while retaining the advantages. Whatever one does about curriculum organization, there will always be the problem of deriving immediate objectives from those more remote or fundamental and of allocating objectives to appropriate units of instruction. Furthermore, while "subjects" may remain the same in name, they may be, and frequently are, changed in content and method so that certain ultimate objectives may be more effectively realized.<sup>11</sup>

In the following excerpt from Barr, Burton, and Brueckner, the importance of objectives and goals to the educational process are discussed. They draw out the relationship between education and objectives. They discuss behavior of man in terms of goal seeking activities.

The result of activity without objectives is discussed in the last paragraph.

There are very few problems in the field of education that can be solved without reference, sooner or later, to the objectives of education. The curriculum, for example, is not an end in itself, but a means to an end, and starts logically with a consideration of the thing for which we strive. Teaching methods are always influenced by what is to be taught and by what outcomes are desired. The qualities that mark the successful teacher, the nature of the materials of instruction, and the conditions necessary for efficiency in learning, are all more or less subordinate to the purposes of education. Specialists in measurement have only recently been forced to revise their thinking about measurement to take into account some of the less frequently measured outcomes of

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<sup>11</sup>E. F. Lindquist, Editor, Educational Measurement (Washington, D. C., American Council on Education, Menasha, Wisconsin, George Banta Publishing Company, 1951), pp. 121-123.

school training such as attitudes, individual adjustment, and integration of personality. Supervision is no exception. Both the program and its evaluation are given direction by the purposes of education. In the last analysis, the means, methods, and materials of supervision can be chosen and evaluated only with reference to the purposes of education. It would be difficult to overemphasize the importance of clearly defined and validated needs and objectives as guides to educational activities.

Man is a goal-seeking animal. He does not ordinarily participate in activity merely for the sake of activity, but rather for fun, to learn, or to improve his lot. These goal-seeking activities of man are in evidence all about us. The educational program is only another example of his striving for some of the things that he considers essential to his own well-being or happiness. To be effective the program must lead toward definite goals.

In the absence of stated objectives, one always runs the risk of having activity that leads in directions not sought or in conflict with current pupil needs. Without such objectives, much activity, valuable at one time, would persist too long after it has served its purpose. In time something else may come to be desired. Better means of achieving old ends may also be discovered. To ascertain the relative effectiveness of new and old means they must be compared under different conditions, for different persons, and for the different purposes, which they purport to serve. In evaluating educational programs and proposing new ones, as we shall in the pages to follow, we must have objectives as referral points in the process of discovering and validating worthwhile educational activity. This applies to the choice of learning experiences, means, methods, personnel, and all other aspects of the improvement program.<sup>12</sup>

In order to help teachers and pupils choose goals, Barr, Burton, and Brueckner have listed in question form a

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<sup>12</sup>A. S. Barr, William H. Burton, and Leo J. Brueckner, Supervision (New York: Appleton-Century-Crofts, Inc., 1947), pp. 147-148.

number of things that one should keep in mind in selecting learning and teaching objectives as follows:

- I. Are the goals in keeping with the broad social needs of man and mankind?
- II. Are the goals in keeping with the needs and developmental status of the pupils?
  - A. The interests, achievements, and capacities of children as determiners of the purposes of education.
  - B. The pupil's past experiences as a factor in setting up educational objectives.
  - C. The child's interest as a factor in the choice of objectives.
  - D. The problem of bridging the gap between the interests, achievements, and capacities of children and those of adults.
  - E. The discovery of the objectives in the relationships between the interests, achievements, and capacities of children and adults.
  - F. The pupil's maturity as a factor in the choice of objectives.
- III. Are the goals in keeping with the function of the school?
  - A. Dewey emphasizes the social function of the school.
  - B. The Educational Policies Commission emphasizes the importance of schools in democracy.<sup>13</sup>

Formulation of goals and objectives are the first step which is taken in any learning or teaching procedure. Remmers and Gage have set forth the following statements to illustrate the desirable form and content for statements of objectives. Some authorities assert that to be most effective as a guide to learning the objective must be in written form.

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<sup>13</sup>Ibid. p. 183-187.



1. Objectives should be worded in terms of changes expected in the pupil rather than as duties of the teacher, since attainment of objectives must in any case be evaluated in terms of pupil changes...

2. An objective should be put in terms of observable changes in the pupil between the beginning and end of his experiences in a defined segment of the educative process. Unless we can tell whether pupils are changed, we shall have difficulty in justifying an objective, however worthy it may appear on philosophical grounds.

3. The terminology of the objective should be understandable; it should have its meaning defined in terms that pupils, parents, and other teachers can appreciate. This requirement, it is readily understood, can often be met only after much thought, discussion, questioning, wording, and rewording.

4. Each statement should be unitary and contain one objective only, to prevent confusion and facilitate ready identification of the objective. To illustrate, such an objective as "To be able to translate French into English and English into French, with correct use of idioms" is less clear than the statement of these objectives in the form of three separate objectives.

5. Objectives should be grouped for purposes of economy and clarity, and for use in guiding pupil activities, in the organization of units of work, and in the construction of evaluation devices. That is, specific objectives should be grouped under the objective that is general to them.<sup>14</sup>

In a listing of some of the factors of learning, Hammonds singled out among others, goals or objectives, level of aspiration, and knowledge of success and error. In establishing production goals we are vitally concerned with all three of these areas. The goals determine the

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<sup>14</sup>H. H. Remmers and N. L. Gage, Educational Measurement and Evaluation (New York: Harper and Brothers, 1955), pp. 33-34.

level of aspiration and provide a means for determining the degree of accomplishment.

Goals are defined in terms of expected results. The level of aspiration is that level which the learner expects to reach. Knowledge of success and error is significant only with reference to one's goals.

Goals or Objectives. A goal or objective implies foresight of the results expected to be attained. It is not just a wish or a belief that the results are desirable, without intention to act on the belief; one does not have a goal which he does not intend to reach through action. The goal is a determiner of action, a determiner of the activities to engage in to reach the goal. It is also a determiner of what will be satisfying and what will be annoying.

Definite goals or objectives on the part of teachers and learners are necessary to a knowledge of results and to observing the progress made. Knowledge of the progress that is being made toward a goal which one has constitutes a reward. To the extent that the desire to attain the goal is strong, the knowledge of the progress tends to be satisfying. There is motivational gain in having a goal, even if the learners fail to reach it. Also, the seeing of functional relationships is increased by having a goal, and there is more likelihood of the good organization of subject matter.

Teachers should realize the desirability of worthy goals or objectives on the part of the learners, whether they be learning goals or goals of some other kind. The teacher, of course, must have teaching goals or objectives, since teaching implies a contemplated product in learning. The learners are not likely to have worthy goals or objectives unless the teacher has. It is folly to expect them to have.

Elsewhere is mentioned the relation that exists between one's goal and the standard of perfection he accepts. If one's standard of perfection has already been attained, goal of attainment no longer exists. If I grow corn or

shear sheep as well as I care to, I shall not be determined to improve my corn growing or sheep shearing.

There are other relationships between objectives and teaching-learning which must not be overlooked. It is largely through learning that desires, wishes, goals, purposes, and objectives are formed. One of the important purposes of education is to help learners have worthy goals and objectives--help provide the needs for learning. The teacher has a responsibility in determining the objectives the learners will have.

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Level of Aspiration. The level of aspiration is the performance level or future attainment that the person sets himself to reach in some task. He aspires to reach this level and feels that he can and will reach it. So it constitutes a kind of a goal for him. People often have quite definite notions of how well they can, should, and will learn to perform, and they regulate their performance and their feelings of satisfaction or annoyance in keeping with these notions or levels.

Success and failure, therefore satisfaction and annoyance, are related to the level of aspiration. What would be regarded as successful performance by one person may not be regarded as such by another. One's expectation should be in keeping with his powers of attainment. Able pupils should not be permitted to set goals far below their ability, and mediocre pupils should not be encouraged to set for themselves levels they cannot attain.

Apparently one's level of aspiration tends to gravitate toward his achievement. It has been observed that, after success, the level of aspiration is likely to be raised, and, after failure, lowered.

It is the business of a teacher to help the learners have the levels of aspiration they should have. Teachers can do a great deal in developing ideals of workmanship and in guiding learners in developing levels of aspiration consistent with their abilities.

Knowledge of Success and Error. Knowledge of

success and error is significant only with reference to one's goal--what one wants to do, where he wants to go or be, etc. In the absence of a goal or objective one response is as good as another; results are not important. Without a goal, there is no success to be satisfying or error to be annoying.

Success in a motivated activity brings reward; failure brings annoyingness. Knowledge of results is necessary for an awareness of success and failure. It defines them, makes their consequences possible, necessitates the selection and elimination of the appropriate and the wrong responses, and helps determine where additional practice is needed.<sup>15</sup>

### III. The Relationship of Goals to Vocational Education in Agriculture

Davenport has dealt with objectives in general concerning the program of vocational agriculture. A perspective of the over-all aims and objectives of our program is important in establishing production goals for farm enterprises because all enterprises included in a student's supervised farm practice program lead to the accomplishment of a common purpose--that of establishment in farming.

#### The Matter of Objectives.

Until we have objectives, we will not arrive anywhere except by accident. Our work cannot rightly be termed education unless we have objectives. Only that learning which results from a more or less definite provision that it shall take place may be called education. Education implies a definite provision by the teacher for what shall be learned and how it shall be learned. The what becomes one's educational or teaching objectives. Educational objectives must be stated in terms of

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<sup>15</sup>Carsie Hammonds, Teaching Agriculture (New York: McGraw-Hill Book Company, Inc., 1950), pp. 41-43.

desirable changes in the learner. Objectives get their sanction from the aim.

No teacher of vocational agriculture would think of taking the members of his FFA chapter on an extensive auto tour without first determining where they will go, the route to take in getting there, and what to see and do on the way. For months before the trip is begun, a study will be made of road maps, expenses, and other factors to make the trip a success.

Yet, many teachers begin an infinitely more important job, the teaching of a course in vocational agriculture of four years, with its accompanying supervised farming program, without first considering and determining the objectives to be achieved, and, when the course is finished, evaluating the accomplishments with a view to improving the work.

The objectives set up for a department of vocational agriculture will be determined largely by the teacher's philosophy of education and what he considers to be the basic values in such work.

No uniform method for listing objectives has ever been determined. An acceptable method is for the teacher to decide upon the changes that can and should be brought about in the students, their farming practices, and the community as a result of the teaching of vocational agriculture in the school. It is desirable that the objectives be accompanied by a statement showing how each will be achieved.

Educational objectives cannot be arrived at except in terms of one's philosophy. There is need for facts, but fact-finding by itself is not a sufficient basis. To determine the facts he collects and the use made of them requires a criterion of value. It is impossible to value behavior in the absence of objectives.

From time to time there must be changes in emphasis on certain objectives to meet the situation that exists. Objectives are not held to as they are when the situation changes radically. To keep objectives just as they were is not to have justifiable objectives. Always, there must be the possible need of changes in the emphasis to meet the situation that exists. This is the center,

heart and soul of a philosophy of objectives.

Consider the phrase "vocational education in agriculture." Education always implies a contemplated product in learning; it is always purposeful, never merely accidental. The process of education always must go on with reference to direction or end sought. Education is always purposefully directed to produce desired effects upon the behavior of the learners. When learning does not result, there has been no education. Education takes place only when there is definite provision for learning--definite provision by the teacher for what shall be learned and how it shall be learned. There is no directing anything in the absence of aim or purpose or objective. There is no vocational education in agriculture; there is no teaching vocational agriculture, unless the teacher knows the learnings he is attempting to secure.

We cannot sidestep or ignore the aim for the simple reason that objectives get their sanction from the aim. All objectives to be justified must contribute to the attainment of the aim.

What learning to secure is now, as always, the most baffling problem in education--in vocational education, in agriculture or any other kind of education. Here we must use the criteria of value. We, human beings, must judge what ends are desirable.

We must consider the significant aspects of the situation. Changes in agriculture are rapidly taking place.

It is more important than ever before that we have definite, justifiable, attainable, education objectives in Vo-Ag.

The need for immediate and direct action, the necessity for good farming practices is more urgent than formerly.

Waste today is more criminal than yesterday--waste of teacher and student time in securing desirable learning because of lack of objectives, waste of soils, waste of labor, etc.

We must keep our objectives educational and not fall for mere prescription.

We must be in step with other programs. We

need not and should not encroach upon the proper fields of other agencies nor should we undesirably duplicate their efforts.

I would like to point out that no teacher can attain all possible worthwhile objectives on any level. In times of emergency rapid selection of objectives are a necessity. When we decide on all of the justifiable objectives of vocational education in agriculture that we can attain on the all-day level, on the young farmer level and on the adult farmer level we will have no room for other activities--the emphasis on other activities will be zero.<sup>16</sup>

Snedden has pointed out in the following material the vagueness of objectives of general education. Whether one agrees with his assertions is not important in this instance. It serves to illustrate the need of objectifying our education in a way that the results can be measured. He emphasizes the application of the material taught in school, or further--the transfer of that knowledge to a living situation.

A large part of the confusion resulting from the efforts of well meaning citizens and educators in promoting these ill-defined and misdirected forms of education can be ascribed to the fact that educators and social economists have not as yet formulated either qualitatively or, far less, quantitatively, the specific objectives and standards of desirable or feasible achievement in those fields of education which we vaguely call "liberal," "cultural," "general," or "intellectual." Historically it has been natural for the schools to accept at their face value appraisements of the educational values of studies made by social organizations and classes supposedly representing "society" in general...

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<sup>16</sup>Roy L. Davenport, Director of School of Vocational Education, Louisiana State University, Unpublished Manuscript. Baton Rouge, Louisiana.

Furthermore, the enormous difficulties involved in tracing and evaluating the actual results to the individual and to society, of many specific studies have always constituted and still constitute a serious barrier to the making of workable distinctions between those outcomes of education which possess significance chiefly in connection with vocational achievement and those others which give qualities of personal culture, general intelligence, civic and moral behavior, and physical well-being. We can, for example, teach children to "draw"; but the probable effects of such bits of skill or appreciation as they may acquire in the process on their subsequent powers, as adults, to execute drawings in their vocations or to exhibit taste and discrimination in their use of products embodying plastic and graphic art are wholly problematical. In our elementary and secondary schools, we devote no inconsiderable attention to the teaching of history, American and general; but the final social functioning of the knowledge of details and generalizations and of the sympathetic ideals and attitudes thus produced is as yet a most uncertain matter.<sup>17</sup>

In the revised (1955) Monograph No. 21 of the U. S. Department of Health, Education, and Welfare, which is a revision of Monograph No. 21 (1940), which was subsequently a revision of the Federal Board Bulletin 153 (1931), suggestions are given for the use of the statements on objectives presented in the monograph. This discussion of the use of these objectives illustrates the importance the administrators of vocational education in agriculture attach to the establishment of sound objectives and proper use of them. This material is given in part as follows:

In the attainment of the objectives, chief concern must be had by the teacher for the individuals

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<sup>17</sup>David Snedden, Vocational Education (New York: The MacMillan Company, 1929), pp. 75-77.



who are recipients of the training program. It is the individual who is being educated. The production and marketing of farm commodities and participation in other farming activities are means to an end in the educational program. The principle of self-activity must be recognized in this educational program as in any other. Farming activities participated in by the individual must be analyzed and checked as to their significance in contributing to the attainment of the objectives. Educational and farming programs to meet the needs of individuals may then be developed with a consideration of the abilities to be acquired as determined by the analysis.

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The present efficiency, as well as the continued development, of the individual is dependent to a large extent upon his ability to procure, evaluate, and use information in the solution of important problems, because decisions reached by the individual must be based on facts, in order to be sound. Individuals enrolled in vocational education courses in agriculture use basic information in the solution of problems throughout the training period and in so doing develop abilities in these respects.

In the development of the educational program, provision should be made for participation in farming activities by the students. Enterprise standards and agricultural objectives should be formulated and used as a basis for the selection of teaching materials. Production standards and other standards of attainment may well be formulated if stated in keeping with accepted standards of efficiency and with a recognition of the local situation. Enterprise goals or standards are usually stated in such terms as, for example, in the hog enterprise, (1) number of pigs raised per sow, (2) weight of litter in 56 days, (3) weight of litter in 180 days, (4) pounds of feed consumed per 100 pounds of pork produced. In reaching such farming goals, which he has set for himself, in keeping with accepted standards of efficiency, the individual will develop specific abilities. The extent to which such standards or goals are attained will be a fair index of the development of

of individuals.<sup>18</sup>

Cook quotes Monograph number 21 in stating the major objectives of vocational agriculture. For a prospective farmer to accomplish these objectives as listed below, he will need to establish production goals for the enterprises which he studies to serve as a gage to determine his degree of advancement toward these objectives.

As stated in Monograph number 21, "The major objectives of vocational education in agriculture are the objectives that must be attained to secure proficiency in farming on the part of those now engaged in farming and of prospective farmers.

"The major objectives of vocational education in agriculture are to develop effective ability to:

1. Make a beginning and advance in farming.
2. Produce farm commodities efficiently.
3. Market farm products advantageously.
4. Conserve soil and other natural resources.
5. Manage a farm business.
6. Maintain a favorable environment.

"The different abilities are needed by individuals in connection with farm jobs and activities and in the solution of farm problems. These abilities are developed in situations where something needs to be done; where the learner has a part in selecting and evaluating information, in drawing inferences, in making decisions, in formulating and executing plans, and in evaluating outcomes. In agricultural education programs the development of the abilities, therefore, depends

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<sup>18</sup>"Educational Objectives in Vocational Agriculture," U. S. Department of Health, Education, and Welfare Monograph No. 21, Revised, Washington D. C., 1955, p. 14.

upon individuals having real situations on the farm as a basis of developing sound judgment and clear-cut modes of action relative to standards of good farming. The attainment of the objectives requires that there be a definite relationship between the course of study and the supervised or directed farming programs of individuals."

There are numerous contributory objectives essential to the successful attainment of the major objectives. These objectives are more limited in scope than those designated as major objectives. A list of contributory objectives essential to the attainment of each major objective should be carefully selected and adopted to meet the local situation. The contributory objectives necessary for the attainment of each of the major objectives are listed in Monograph No. 21 of the U. S. Office of Education.<sup>19</sup>

#### IV. The Relationship of Production Goals to Learning in Vocational Agriculture

In the program of vocational agriculture the farming program provides an opportunity for the student to test the degree with which he can apply the material that he has studied in class. Deyoe, in the discussion below has in part quoted Hamlin in pointing out that farming programs provide an important basis for evaluating the effectiveness of instruction in vocational agriculture.

"The proof of the pudding is in the eating." This is no less true in appraising the results of education than in other phases of life. In our schools, there has long been a tendency to stop short of the application stage in the learning process and to evaluate our instruction without evidence of carry-over into the out-of-school world. One leader in agricultural education has

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<sup>19</sup>Glen Charles Cook, Handbook on Teaching Vocational Agriculture, Fifth Edition (Danville, Illinois: Interstate Printing Co., 1947), pp. 12-13.

said, "We do not, anywhere except in school, consider that a thing is learned unless it can be used and is used habitually in all appropriate out-of-school situations." Through supervised farming, it is possible to determine what has been applied and how well it has been done, so far as many important aspects of vocational agriculture are concerned.<sup>20</sup>

Deyoe refers to production goals as achievement goals. He discusses, in the following paragraphs, the process and the time for formulating achievement goals. He also lists some reasons for achievement goals.

In planning the program of supervised farming which he has selected, each student should be encouraged to formulate long-time and yearly goals of achievement in terms of profits, labor income, increased net worth, change in farming status, and growth in ability to farm.

In addition to these broad or over-all goals, it is desirable for each boy to formulate specific achievement or production goals appropriate for each project and in keeping with his conditions. These goals may be stated in terms of yield per acre, production per animal, feed per pound of gain, quality of product in terms of market grade, rate of gains, percentage of survival of animals, or others appropriate to each enterprise. (It is to be noted that these are stated in terms of efficiency factors frequently included in the analysis of project records.)

Goals of achievement are desirable for the following reasons:

1. These goals challenge each student to achieve on progressively higher levels. If rightly set up and used, they will stimulate him to do this primarily by "beating his own record", and competition with other persons will be minimized.

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<sup>20</sup>Deyoe, op. cit., pp. 28-30.

2. In the process of formulating and using goals of achievement, valuable instruction is provided for each student and the class as a whole. In the past, only limited attention has been given to this phase of instruction in vocational agriculture, and consequently many students are grossly ignorant of what should be considered as a highly creditable achievement and what is average or mediocre.
3. The formulation of such goals leads almost inevitably to the consideration of "What do we need to learn in order to reach our goals?" Thus, these achievement goals serve as a focal point in guiding students to formulate the specific types of objectives in terms of their personal growth and development which are necessary if the goals are to be reached.
4. The degree to which these goals are achieved is indicative of the extent to which certain farming abilities have been developed. In other words, these goals have an important relationship to evaluating the effectiveness of supervised farming, as discussed in Chapter III. Furthermore by noting his level of efficiency, the student can determine places where emphasis is needed in successive years if achievement is to be attained on progressively higher levels.<sup>21</sup>

Cook places the formulation of production goals after the broad objectives for the farming program have been established. The method of formulation and statement are also mentioned.

After the broad objectives for the farming program have been formulated, the student should determine the production goals of achievement he desires to accomplish. These may be stated in terms of the amount of feed required to produce a

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<sup>21</sup>Ibid., pp. 231-233.

quart of milk or a pound of gain, yield per acre, weight of pigs at 56 days, pounds of wool, weight of lambs at five months, and the like. These goals or standards of production should help the student in reaching his objectives. They should be set up on the basis of long-time plans and individual projects which may also be summarized for specific years. Class discussions should be held on the meaning and importance of standards and the goals to be achieved. Individual students should make a thorough study of standards which have been reached by former students, progressive farmers, and/or experiment stations. These should be compared with those on the home farm at the present time and the student should decide on the goals or efficiency measures of production he hopes to reach. Such standards and goals represent a number of efficiency measures in production which should stimulate considerable interest in selecting essential jobs and problems in connection with farming programs to be used in developing course content. At the end of the year the student should check his records to see which of the goals he has attained and review these with the instructor.

Various experimental data are useful in determining efficiency measures of production. Such data as the amount of mash and grain required to grow chicks to different ages until maturity, the average gain of chicks by weeks, and the like, are helpful in setting goals in raising chicks.<sup>22</sup>

Most authorities quoted in this study refer to the use of production goals as a means of motivating and evaluating the learner in his work. Hammonds discusses production standards and goals as being important in helping teachers guide the students in selecting the farming program. The following presentation provides this different aspect of uses of production goals--that of guiding the student in determining the farming program.

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<sup>22</sup>Cook, op. cit., pp. 354-355.

He also discusses permanency of production goals.

It will be of much help to the teacher in guiding students in selecting their farming programs, as well as in guiding them in writing their plans later, if production standards and goals are discussed and at least some department production goals are set by the students and teacher. (Individual production and achievement goals will be set by the students as they plan their farming programs.) Students should strive to secure good crop yields and good animal production in their farming programs. Good production is a characteristic of good farming. But students at first do not know the importance of good production to success in farming and in learning to farm. Nor do they know what good production is. They often think that any kind of production is all right, particularly if it is the production secured at home. Therefore, they do not understand the necessity for using improved practices. To this extent they are "in the dark" in deciding on their farming programs. They should realize that good production and improved practices go together, both of them being necessary in a good farming program. When they do not already know the necessity for good production, what good production is in the local community, and the necessity for using improved practices if good production is to be obtained, they can be taught these things just as they can be taught anything else. Teaching is the teacher's primary job.

"Production goal," as the term is used here, refers to a goal to be reached, not to an ideal which is seldom attained. It need not be a permanent goal; production goals are to be arrived at, plenty of data or facts will have to be used in arriving at them. Goals cannot be set out of "thin air." There are many sources of data: projects completed in the local school, production by the better local farmers, farm-management studies, soil experiment or demonstration fields in the region, state laying-flock demonstration records, Dairy Herd Improvement Association releases, and the like. There is less need that the farm-animal data be local data than that the crop data be local. Factors in animal production are largely under the control of the producer--much more so than in crops, which depend so much

on soil, temperature, and moisture.<sup>23</sup>

In an article concerning approved practices and their place in developing farming programs, Deyoe lists some activities in developing and using approved practices. They have to do with measures of efficiency, present level of efficiency, classification of present level into the standard level of efficiency, formulating goals, and determining abilities if goals are to be reached.

Activities Involved in Opening Up Each Enterprise:

1. Developing with the students an understanding of measures of efficiency appropriate for each enterprise represented in the supervised farming programs.

Examples--"How can we measure our efficiency as swine raisers?" (or "dairymen?", "bean growers?")

Some Measures of Efficiency in Swine:  
Weight of litter at 56 days  
Number of pigs per litter raised to 56 days

Some Measures of Efficiency in Dairy Cattle:  
Annual butterfat production per cow  
Calving percentage (regularity of reproduction)

Some Measures of Efficiency in Beans:  
Yield in terms of bushels per acre  
Percent of "pick" of beans marketed

2. Securing estimates or actual figures on present level of efficiency on projects completed by members of the group or on enterprises on home farm.

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<sup>23</sup>Hammond, op. cit., pp. 185-186.



Example--"What is our present level of efficiency in swine production?" (Note: Altho estimates may be necessary when this problem is discussed for the first time in a group, appropriate records should be started which will provide actual figures at a future date.)

3. Deciding how "good" the present level of production is in terms of acceptable standards of efficiency.

Example--"How does my production compare with the average for farmers in the region?" "With the average of similar projects completed by other students?" "With the upper third of these projects?" "What are the possibilities for improved efficiency in my sow-and-litter project?", etc.

4. Formulating goals by each person in terms of measures of efficiency for each enterprise.

Example--"What should I attempt to accomplish in terms of 56-day litter weights?", etc.

5. Determining some of the abilities needed if goals are to be reached.

Example--"What do we need to be able to do, that we cannot do now, if we are to secure the 56-day litter weights that we have set as our goals?" "What do we need to learn during the coming year?"

Study of Problems Seasonally:

1. Studying specific problems involved in improving the level of efficiency in a given enterprise (as the result of Item 5, above).

Example--"How can we care for the sow and litter at farrowing time so as to save the maximum number of pigs?"

As an outgrowth of studying and discussing this problem, the class should be guided in stating some of the approved practices which affect the number of pigs saved. The necessary background for this will be developed from a study of appropriate printed materials, visits to farms of good hog raisers, and pooling of experiences. Each statement of an

approved practice thus becomes a generalization substantiated by experimental evidence or use by successful farmers, or both. For instance, one approved practice growing out of the above problem might be to "Use an electric pig brooder or heat lamp."

2. Developing ability or skill involved in carrying each practice to the "doing stage" and actually applying the practice to his program.

Example--"How should pig brooders be constructed?" (Boys should study plans for approved types of pig brooders, and, if possible, see actual brooders.) "How can we provide pig brooders for our projects?" Definite plans should be developed and carried out by each boy for constructing brooders adapted to his situation, securing materials, and using the brooders in the sow-and-litter projects.

Study of Results During and After a Production Cycle:

1. Accumulating and summarizing the records which reveal measures of efficiency.

Example--At appropriate times during the cycle of swine raising, and following the completion of the cycle, stimulate each boy to raise the following question: "What level of efficiency did I actually achieve in swine production?"

2. Analyzing the measures of efficiency to note relation to use or lack of use of appropriate approved practices.

"What approved practices were applied effectively in my sow-and-litter project?"  
"What ones were ineffectively applied or neglected entirely?"

Study of Successive Cycles of the Projects:

1. Deciding on shortcomings as producers of swine, etc.

"What additional approved practices should I utilize in caring for the sow and litter at farrowing during the coming cycle of production?"

"Which ones do I need to learn more about in order to apply them more effectively than before?" At various appropriate times during the year, further instruction will be provided in developing the abilities involved in applying approved practices.<sup>24</sup>

Joe Duck, of the University of Missouri, discusses the improvement of learning through the increased use of goals and efficiency standards in the farming program. He sets up the steps which the teacher uses in getting his students to set up such a program. Included in the article is some commentary by teachers concerning the use of production goals and efficiency standards in teaching. According to the author of this article, determining goals and standards, analyzing projects for efficiency, and comparing project analyses are learning activities.

A beginning has been made in Missouri in the improvement of learning through the increased use of goals and efficiency standards in farming programs, a process that has "squeezed the water" out of project accounting. To reach this objective it was necessary for the teacher to take only three steps not used before: (1) guide each student in the setting up of goals and efficiency standards for each of his production projects, (2) teach each student to analyze his completed projects, for efficiency, and (3) compare the analysis of each completed project with all other student projects of the same type and with "official" standards.

#### What Teachers Say About It

Before telling you how some teachers have

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<sup>24</sup>George P. Deyoe, "Approved Practices and Their Place in Developing Farming Programs," Agricultural Education Magazine, 17: 26, August, 1944.

increased the effectiveness of their teaching through the use of project analyses, listen to what they say about the subject. William Day at Washington says: "I have found that analyses have reduced our labor income rather than increased it because the students are more careful about accounts. -- The students learn more from these records than from books. -- A study of the records is worth more than several hours' lecture or discussion on what some unknown person or persons did." Oral Barrow, supervising teacher at Rogersville, wrote: "Better records are kept by the student when he knows that his analyses will be placed on a chart with those of other students for all to see." Maxwell Lampo of Carl Junction asserted: "I have found that the comparison of analyses has been most effective in selling the parents on the value and the need of farming programs for their sons. -- I used the analyses in connection with my Parents' Night Program. -- The students are beginning to develop some efficiency standards, and so am I." K. L. Russell, teacher of vocational agriculture at Neosho said, "Recently while comparing project summaries, one boy insisted there was a mistake in his records; he reviewed his record book and found a "\$50 error." T. V. Davis, teacher at Duamond, expressed the opinion that progress of the department from year to year in any enterprise may be measured by means of comparing achievements in terms of efficiency standards.

Table I -- Goals and Efficiency Standards Set Up by a Student of Vocational Agriculture at Washington High School, 1945-46

Goals and Standards	Average Farmer*	Dept. Standard	My Goal	My Achievement
1. Per cent of chicks raised	85	93	90	94
2. Ave. wt. at 12 weeks	2.2	2.97	3.0	2.77
3. Feed to produce 1 lb. gain	5.0	4.0	4.0	4.2
4. Feed cost for 1 lb. gain	.18	.15	.17	.17
5. Total cost per 1 lb. gain	.27	.22	.27	.30
6. Price received per lb.	.30	.34	.35	.43

\*The author suggests the use of another column, "superior farmer."

Table II. Analysis of Broiler Project of Student at Washington High School.

	My Project	Dept. Average	Others*
1. No. of chicks at beginning	300		
2. No. of broilers sold and used at home	297		
3. Per cent of chicks raised to market age	99		
4. Lbs. of feed to produce 1 lb. broiler	4.2		
5. Cost of feed per bird	.52		
6. Cost of heating house per bird	.008		
7. Cost of chicks, each at start	.107		
8. All other costs per bird except labor	.06		
9. Labor cost per bird	.07		
10. Total cost per bird	.76		
11. No. of lbs. produced	1010		
12. Ave. weight per bird when sold	3.3		
13. Total cost per lb. of broiler	.22		
14. Selling price per lb. of broiler	.27		
15. Selling price per bird	.89		
16. Profit per pound	.05		
17. Profit per bird	.165		

\*"Others" refers to other students' projects, to adult farmers' records, experiment station records, and any other records which will enable the student to measure his efficiency and to make adjustments in future management of his projects.

Table III. A Study of Broiler Production Projects, Washington High School, 1946-47

Student's Name	No. of Chicks	Per Cent Raised	Kind of Feed	Lbs. Feed per Lb. Gain	Ave. Wt.	Total Cost of 1lb.	Price Rec'd.	Date Sold
A	600	52	--	5.45	2.06	\$.310	\$.375	Jan.2
B	300	99	--	3.08	3.02	.162	.275	July 3
C	300	99	--	4.02	3.03	.220	.27	Nov.15
D	400	87	--	4.68	2.10	.233	.30	Apr.15
E	200	96	--	5.45	3.06	.310	.38	Aug.1
F	300	100	--	3.72	2.50	.205	.33	Apr.17
All Projects, 1945-46	4785	90.6	--	4.03	2.80	.224	.34	

Note: Other factors may be added to those analyzed in this table.

### Determining Goals and Standards Is a Learning Activity

Each of the three steps named in the opening paragraph will now be discussed in order. A part of the planning of each project is the setting down in writing of the student's goals and efficiency standards. In Missouri, the project accounting book has a page involving the headings shown in Table I.

The procedure for guiding the student in the completion of the page represented by Table I depends upon a number of factors, one of which is the student's year in vocational agriculture. With the beginning class, the teacher works first with the entire class in the setting up of goals and efficiency standards for a student who has a project common to the class. It is necessary that the class first be motivated as to the necessity and the importance of having goals and standards. This can be done by asking such questions as: How many miles should you get from a gallon of gasoline in a 1941 automobile? Is 5 feet a good high jump for a boy of high school age? How many bushels of wheat per acre may be grown on average soil in this community? How many pigs should you raise from a sow? What is a good milk cow? How much feed will it take to raise 500 New Hampshire Cockerels to an average weight of 3 and one-half pounds? The discussion will bring out the fact that students have standards on some things but not on others. It should inform the student that standards may be based upon one or more of such sources as the following: class average, experiment station records, D.H.I.A. average, best achievement of a class member, achievement of superior farmers.

It is the responsibility of the teacher to provide data for the column Average Farmer. He may call on the state supervisory staff and/or the teacher-training staff for help in securing these data. Figures for the column, "Department Standard," have previously been agreed upon by the teacher and members of the advanced classes. These figures are provided for members of the beginning class with some explanation by the teacher as to how they were arrived at. The figures for the column "My Goal" are discussed by the members of the class and particularly with the student whose project is being planned. The

column "My Achievement" is not completed, of course, until the project is closed. After the class understands the purpose of the page and how it is to be used, each individual begins work on the selection of goals and standards for his own projects. The teacher passes quietly among the students, giving help and encouragement when needed. Second, third, and fourth year students do not need as much help in setting up goals and standards as the beginning students, assuming that they received training in it when they were beginners. Goals and efficiency standards, of course, should be set up before detailed plans are written for conducting the project. Plans should take into account the goals the student is attempting to reach and the standards of efficiency he is attempting to achieve.

#### Analyzing Projects for Efficiency is a Learning Activity

The second step named in the opening paragraph is taken as soon as the project is completed or at the of a year, whichever comes first. The student makes a financial summary of his project and analyzes it in terms of efficiency factors set up when the project was planned. For this, he uses a form provided by the teacher. In Missouri, a special form is used for each of ten major types of projects. They are: milk production and dairy heifer, sow and litter, feeder animal production, beef cow and calf, ewe and lamb, egg production, pullet production, broiler production, field crops, and miscellaneous. A special form is better than a general form for summarizing and analyzing because the items are named specifically and, therefore, have more meaning. Also, it has been found that the student is less likely to omit items of expenses and receipts when a complete listing is on the form. The student makes the summary and the analyses by himself, putting the figures in pencil, after which he asks the teacher to review the figures with him. If omissions or other mistakes are found, the student makes the changes, not the teacher. When it is completed to the satisfaction of the student and the teacher, the figures are put in ink. Two copies are made, one of which is given to the teacher for his files and the other is placed in the student's record book.

Such an analysis contains valuable teaching



material that will justify discussion by the class. For example, the teacher may point out that 4.2 pounds of feed were required to produce 100 pounds of broilers, which is approximately .2 of a pound higher than the average of the department for the previous year. He might raise the question, "Why did it take more feed in this case than it did for the average?" The question may be raised as to why the cost of fuel per bird was only .8 cents, whereas the average cost of fuel per bird for the department was 2.7 cents. With the help of the owner of the project, the possible causes are discussed and the solution found.

### Comparing Project Analyses Is a Learning Activity

Unless the third step named in the opening paragraph is made, much of the teaching value in the use of goals and standards will be lost. The third step is the comparison of all the production projects of the same type conducted during the school year. This is when the records are put under the microscope, so to speak. The teacher makes a large chart of all the project data, on paper or sign cloth, for permanent reference. The class or the group having broiler projects, depending on the size of the two, studies the chart. Table III represents a chart actually used in the department of vocational agriculture at Washington.

A study of the above table represents many opportunities for effective teaching. An examination of the table may bring out the following questions:

1. Why did student D raise only 87 per cent of his broilers?
2. How could student B produce a pound of broiler on only 3.08 pounds of feed, while students A and D used 5.45 pounds of feed and student C used 4.02 pounds?
3. Why did student E receive 38 cents a pound for his broilers, whereas student C received only 27 cents a pound?
4. Why did student E start with only 200 chicks? What is an economic unit for broilers?

The study of material similar to that in Table III offers opportunities to develop in the student desirable attitudes, ideals, appreciations, standards, and other attributes, in addition to the acquisition of knowledge. The student will receive practice in solving real problems, which is better than memorizing material from books or bulletins. He will develop the habit of analyzing situations carefully before acting. The keeping of accurate accounts, which must accompany the development of goals and standards, will become an ideal and may develop into a habit.<sup>25</sup>

The meaning of and the use of production goals and how to improve your teaching by using them is discussed in the following article by Wall.

Workers in agricultural education should be concerned with evaluating the progress of students in developing and carrying out their farming programs. Teachers should evaluate the progress they make toward the attainment of their teaching objectives. Many of the evidences of the change in the learner's behavior may be manifested in the changes in agricultural practices followed by the learner.

#### Relation of Goals to Practice

Much has been written and said as to the need for practice in order to learn. Even so, some people get mixed up in their thinking as to the basic reason why students should have farming programs. This can be illustrated by a recent observation: A teacher and class listed as one of the reasons for having a farming program--"Opportunity to practice what we have learned in class." The teacher should not have students engage in a supervised farming program in order that the students may practice what has been learned, but in order that the students may learn. Always, of course, there should be plenty of opportunity to practice what has been learned.

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<sup>25</sup>Joe Duck, "Increased Learning Through the Use of Goals and Efficiency Standards in Farming Programs," Agricultural Education Magazine, 20:192, April, 1948.

One's goal determines his action, determines the activities he engages in as he attempts to reach the goal. It is through engaging in activities that learning takes place. In the absence of goals, the learner has no desire to do things differently than he is now doing them. The same thing applies to teachers. If teachers have no goals relative to students' having better farming programs or to providing better learning experiences through the farming programs, there will likely be no change in what the teacher will do in securing better farming programs. Persons who are satisfied with what they do--who believe it to be good enough--will not likely change their manner of performing.

#### Production Goals

Students may set goals in terms of specific yields or other forms of production they hope and expect to attain. Goals may be set in terms of the product secured in the enterprise by the end of the period, such as pounds of butterfat produced by a cow in one year; or they may be set in terms of results which occur while carrying out the enterprise, such as the number of lambs dropped per ewe. Students should have goals for each efficiency factor in the enterprise to be conducted.

The teacher of vocational agriculture should focus his attention on accepted (by authorities), justifiable, desired (by the students), learning achievement in his teaching and then relate his teaching efforts to the achievement. He needs to keep in mind that boys may stress achievement other than learning as being evidence of progress. The desired learnings will take place if the teacher provides the necessary meaningful learning experiences in securing the achievement.

Ordinarily, achievement does not occur only at the end of an undertaking. Instead, it occurs all during the undertaking. To get a flock of ewes to drop 1.3 lambs per ewe is an achievement. The teacher need not wait until the lambs are sold to recognize this as an achievement or to cause the student to see the relation of the results secured to the practices carried out. The time to do this is as soon as the lambs are dropped. The same is true in securing good production in dairying. The student need not wait until the

end of the lactation period to determine if the cow is producing in terms of the yearly production goal. In fact, it may be undesirable to keep a cow through the lactation period if her total production will likely be too low.

### Setting Production Goals

The setting and using of production goals (which may later be used as production standards), especially the intermediate goals for the efficiency factors in an enterprise, can greatly increase the effectiveness of the teaching-learning situation.

One of the real values of establishing intermediate goals for the various phases of each enterprise is that it enables the student to have clearly in mind the production he hopes to secure. The intermediate goals become mileposts by which the student can determine if he is on schedule in attaining the final, over-all goal. They serve as a closer magnet toward the kind of performance the student accepts, and enable him to have evidence of his success or failure nearer the time of the performance. Knowledge of the occurring achievement (success or failure) contributes much to nearly all learning. Once a student understands that certain efficiency factors have a direct bearing on his success, he is ready to study and decide how he should carry out the practices that will affect the final outcome in terms of his goal. There is then an opportunity for meaningful learning.

Immediately after the student has selected an enterprise to be in his farming program, he needs to establish production goals in terms of the efficiency factors which apply to his conditions. Fairly frequent checking on the progress made is essential if students are to receive guidance in overcoming difficulties. Teachers cannot intelligently plan their instruction unless they know the difficulties and where they exist, and then cause the students to recognize the difficulties. The teacher should guide the student to give emphasis to those factors that can be measured objectively, such as weight of pigs at 56 days; number of lambs dropped per ewe; pounds of milk produced during the second month of lactation; etc. In so doing, the student has set for himself certain goals, with the attainment not too far in the future, which provide motivation

for meaningful learning through striving to attain them.

Students can determine the progress being made toward the attainment of their goals by comparing the results they are securing with the standards and with other students. For example, if boys know the relation of the weight of lambs at 60 days and the likely weight at 120 days, they can check the weight of their lambs at 60 days and determine the progress being made toward the 120-day weight goal. If certain practices necessary to attain the goal are being neglected, they may be detected and the necessary changes made to enable the boy still to succeed with the project. Some teachers spend a great deal of time in teaching the various phases of farming and then are satisfied with recording only the total amount of products produced or marketed and calculating the income. Sometimes entrants in various contests are recognized as having done an outstanding job, using only these two criteria as a basis. Granted the desirability of knowing these things, it is only a partial evaluation of the students' achievement of proficiency in the enterprise. When they become the teacher's only criteria for evaluation, much opportunity for good teaching is lost.

#### Using the Production Goals

The students must be caused to realize that they cannot attain their production goals unless they use good practices. What practices the students should follow and how to carry them out become the basis of problem solving both in the class and in on-farm supervision. As the student, from day to day, is aware of how he is progressing toward his next goal, he is conscious of the need for learning how to carry out each practice that contributes to attaining his goal.

The interest of the student in adapting and using improved practices will be greater if he discovers the need for their use when something can be done about it immediately. To discover, after the project has been completed, that he should have used some practice and he will not need to use it again for several months, does not provide much challenge. Therefore, he does not have much incentive to learn the practice.

Teachers spend time and effort in getting

students to keep farming-program records. The chief reason for keeping records is the use to be made of them. If students do not use the records they have kept, they have less and less interest in keeping records. Junior and senior boys should have more interest in and do a better job of keeping record than freshmen and sophomores. However, the reverse is true in many cases, due to the fact that after keeping records as freshmen and sophomores, no use was made of them other than to fill in a summary form.

The use of production goals and standards, in terms of the efficiency factors in an enterprise, from the planning of an enterprise to its completion, will stimulate interest in record keeping and help give meaning to records, summaries, and the evaluations that may be made. The student is able to decide realistically whether or not he is making progress, and whether his goals were too high or too low. By periodically checking on the attainment of his goals, the student can know to what extent superior performance is necessary on his part to attain the goals.

Farmers need to evaluate their performances intelligently. Prospective farmers need to learn to evaluate their performances. They can learn this only through evaluating them. Teachers of agriculture should teach their students to evaluate their own performances. A fundamental step in teaching an improved practice is to see that the learner develops the ability to evaluate the results from the use of the practice. If learners do not acquire this ability, the teacher has failed to fully teach the use of an improved practice. As already stated, teachers spend a great deal of time attempting to teach improved practices. If this time is to be spent most effectively, some of it must be used in teaching the learner to evaluate his progress--evaluate throughout the project, not at the end only.

#### Keeping and Using Progress Charts

One of the easiest ways of getting students to have intermediate goals is to provide a progress chart on which the students may record their goals. The chart should have space for listing the student's name and other facts about the project such as degree of ownership, scope, etc.

Columns should also be provided for each efficiency factor that is to be checked on. Production goals in terms of each of the efficiency factors should be decided on and entered in the appropriate columns as soon as the student has selected the project. Probably the teacher should have progress charts for all the enterprises on which he spends group-teaching time. For example, if teaching time is allocated to group teaching of improved practices in sheep production, the teacher can justify using group time in keeping and using a progress chart on the sheep projects.

After the project is under way and the first milepost has been reached, the progress should be checked and evaluated. For example, if a progress report is being kept on sheep projects, soon after the students' ewes have finished lambing the progress to that point should be checked and evaluated. A comparison of results secured should be made to the improved practices carried out. The teacher should be able to cause each student to understand how and why he came out as he did. The student should recognize the relation between the practices he used and results secured. If he has reached his goal, he should realize that it was due to the use of certain good practices. If he failed to reach his goal, he needs to understand why he failed. He should be able to see the relation of where he is now to his ultimate goal. If he is behind schedule, he will want to know what can be done to attain the goal. In some cases he may need to realize that his achievement is so far behind that it will not be possible to attain the goal; therefore, he will need to revise his goal. His achievement may be so good that the goal is no longer a challenge; in his case he will want to revise it upwards.

When the teacher is providing such teaching-learning situations much meaningful learning will take place.<sup>26</sup>

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<sup>26</sup>Stanly Wall, "Using Production Goals," Agricultural Education Magazine, 26:55, September, 1953.

CHAPTER III  
EFFICIENCY FACTORS, EFFICIENCY STANDARDS,  
PRODUCTION GOALS, AND APPROVED PRACTICES  
RECOMMENDED FOR ATTAINMENT OF  
PRODUCTION GOALS

Preliminary Statement

This chapter treats the second, third, fourth, and fifth propositions of the problem analysis included in the statement of the problem. The propositions are:

- (2) What factors concerning the production of a farm product are indicative of the efficiency of production?
- (3) What are the current efficiency standards of the listed efficiency factors of various farm enterprises in the state?
- (4) What are the suggested production goals of various farm enterprises in the state?
- (5) What are the approved practices recommended for attainment of production goals?

The reader should bear in mind that the figures given are only studied estimates by the authorities cited. The estimates were deemed necessary because the type of statistics requested is not available as a matter of record, according to research done by the writer.

The specialists from whom the information was collected, repeatedly stated that the approved practices included herein are subject to constant change. The



writer recognizes this tendency toward change of practices, but insists that inclusion of the current approved practices is necessary to the completion and value of this study. It will be the responsibility of the user of this material to revise these practices and production goals as new technical methods of agricultural production are developed and information concerning them is made available.

The reader is further reminded that the suggested production goals as well as the other points of information in this chapter are based on an average situation in a given production or soil type area. In using this information, one will need to adapt these general figures and recommendations to his specific situation.

The listed approved practices recommended for the attainment of production goals do not necessarily include all the approved practices required to reach the production goal. The authorities have assumed in some cases that certain approved practices are consistently practiced by the majority of farmers. Those listed in this chapter are those practices which they assume are not generally carried out in the production of a particular product and must be in order for the production goals to be reached. The authorities base their assumptions and estimates on the average successful farmer.

The writer recognizes that the efficiency factors which are stated in terms of "the degree to which the

recommendations of the Experiment Station are followed," will be in some cases difficult to measure accurately. However, in the opinion of the authorities cited, these factors were in all cases indicative of efficiency. For the purposes of this study and the application of the following material, this method of measurement used in these instances will serve the purpose in the absence of a more accurate procedure.

The enterprises are arranged in this chapter in the following order: cotton, rice, sugar cane, corn, sweet potatoes, strawberries, shallots, Irish potatoes, pecans, snapbeans, cabbage, pasture, breeding beef cattle, fattening beef cattle, commercial milk production, raising the dairy calf, breeding swine, fattening swine, market egg production, broilers, hatching egg production.

## Cotton

### I. Introduction

#### A. Economic importance

Cotton is the most important source of cash farm income on some 1,500,000 farms in the United States. It accounts for approximately one-third of the total cash farm income for the cotton states as a whole. In Louisiana, cotton accounted for approximately 31 per cent of the total cash farm income in 1951 and there is no indication that it will lose its place as the South's most important crop in the near future.

The importance of cotton is not limited to the farmers who grow the crop or to the Cotton Belt alone. It is a commodity whose ups and downs have a far-reaching effect upon

the economy of the entire nation. In addition to the 1,500,000 farmers who grow cotton, it has been estimated that 3,000,000 people work full-time or part-time in ginning, marketing, transporting, processing, manufacturing and retailing cotton and cotton products. Of our total population the welfare of 20 to 25 million people, not to mention the consumers, depends to some extent upon the cotton industry. By-products of cotton are also of vital importance to the national economy--cottonseed oil for food products, paints, etc., and cottonseed meal as a source of protein supplement for livestock.

The acreage planted to cotton in the United States has dropped from 42,600,000 acres in the 1925-29 period to 25 to 29 million acres during the past few years. This is a cut in acreage of nearly 33 per cent. In Louisiana, the acreage planted to cotton has dropped from an average of 1,729,000 acres during the period of 1925-29 to an 852,000 acre average for 1947-51. The reduction in acreage in the last two decades has resulted in concentrating production more and more on the better soils of Louisiana. This generally has meant higher yields and more economical production.

In 1951 the average yield of lint cotton per acre for the cotton belt was 246 pounds. The average yield per acre in Louisiana in 1951 was 391 pounds. Increased yields have been due to a number of factors, including the concentration of production on better soils, better fertilization, other improved cultural and farm practices and better varieties of cotton.<sup>27</sup>

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<sup>27</sup>R. A. Wasson, and I. W. Carson, "Louisiana Cotton," Agricultural Extension Publication 1132, Louisiana State University, Baton Rouge, Louisiana, November 1952, p. 3.

B. Areas of production

According to Carson,<sup>28</sup> the State of Louisiana should be divided into the following land areas based on cotton production per acre:

Area I -- Mississippi and Red River Delta

Area II -- Brown Loam

(This area includes the following  
parishes: Catahoula, Franklin,  
Richland, West Carroll, East  
Feliciana, and West Feliciana.)

Area III -- Prairie

Area IV -- Hill

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<sup>28</sup>I. W. Carson, Associate Agronomist, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, September 1, 1955.

## II. Efficiency standards and production goals

Table I.--Production Goals for the Cotton Enterprise.<sup>29</sup>

Efficiency Factors	<u>Efficiency Standards</u>				<u>Production Goals</u>			
	<u>Land Area</u>				<u>Land Area</u>			
	I	II	III	IV	I	II	III	IV
1. Yield of lint cotton per acre (pounds)	450	280	300	200	1,000	600	700	400
2. Per cent shed of forms	50	65	60	70	40	55	50	60

The figures in this table are studied estimates of the authority cited.

## III. Approved practices recommended for attainment of production goals<sup>30</sup>

(The following material is taken in part from the source cited.)

### A. Use high quality seed

1. Use delinted, treated seed of a variety adapted to the area.
2. Plant a wilt-resistant variety, if the soil on the farm is infested with Fusarium wilt.
3. Use a variety which fluffs well for machine harvesting.
4. Never plant seed more than two years removed from the breeder, if it can be helped.

### B. Use the adapted variety

<sup>29</sup>Carson, Interview, September 1, 1955.

<sup>30</sup>Wasson and Carson, op. cit., pp. 6-21.

1. Deltapine 15:

Resistance to Fusarium wilt and boll rots is fair. The Deltapine cottons are different in that they have both a high lint percentage and a good staple length. They are adapted to rather general use but are probably best suited to the poorer alluvial lands and richer hill and prairie lands of the state where Fusarium wilt is not prevalent.

2. Stoneville 2B:

Lint percentage is 34 to 38. Disease resistance is only fair. The variety is early and productive. Stoneville 2B is a good picking cotton and does well on most lands in the state that are not badly infested with the Fusarium wilt organism.

3. Coker 100 W. R.:

Lint percentage is 34 to 38 and staple length  $1 \frac{1}{32}$  to  $1 \frac{3}{32}$  inches. It has good resistance to Fusarium wilt. Coker 100 W. R. is an early, productive variety that is well adapted to most Louisiana conditions.

4. Delfos 9169:

Lint percentage is 34 to 38. Delfos 9169 is a somewhat better picking cotton than most of the other strains of Delfos and is a good cotton for Delta and other alluvial lands of the state where the soil is not infested with cotton wilt.

5. Louisiana 33:

Staple length is 1 inch. Lint is 40 per cent. This variety grows vigorously and is 98 per cent resistant to Fusarium wilt. It is adapted to the better alluvial lands and richer hill lands of Louisiana, especially where Fusarium wilt is present.

6. D & PL-Fox:

Fox is earlier fruiting than Deltapine 15 and opens 10 to 15 days earlier. It has

about 1/32 inch shorter staple than Deltapine 15 and 2 to 3 per cent lower lint percentage. Fox bolls are about the same size as those of Deltapine 15 but are more easily picked by hand. A large percentage of Fox can be harvested at the first picking.

#### 7. Other varieties:

There are, of course, several other varieties that have merit and are well suited to certain areas. Some of these varieties are Stoneville 5A, Coker 100 Staple, for the better lands, and Wilds, where an extra long staple is desired.

#### C. Prepare seedbed well.

The following practices of good cotton farming set forth the jobs as they should be done for highest yields and largest profits.

Where cotton follows cotton, spring-breaking is recommended (late February and March). This will largely prevent surface-washing, leaching and packing of the soil and will cause the cotton stalks to rot more quickly. Reverse rows before planting. This applies to clay and silt loams, loams and sandy loams. A shredder type stalk cutter used on the crop residue ahead of breaking will improve the physical condition of the soil for planting and cultivating.

Where a winter legume is grown on these soils, turn the legume under between late March and early April. Where the equipment is available, the best method of turning the legume under is to cut it in thoroughly with a tractor disk and put land into rows for planting. Wait from two to three weeks to plant after turning the legume under. A settling rain prior to planting will improve the conditions for seed germination.

Additionally, on these same soils where cotton follows corn interplanted or is grown in alternate rows with soybeans, turn the beans and cornstalks under as soon as corn is harvested. This gives a better rotting of the cornstalks. Discing prior to turning under is recommended. After discing put the land into rows with a middle-buster or disc plow. Where cotton follows

soybeans grown alone for seed, turn under as soon after combining as possible.

In preparing a seedbed for cotton on heavy clay ("buckshot") soils, there are three methods generally used:

1. Bed in the fall. Knock off rows in the spring and plant. Cultivate middles either immediately before or immediately after planting to kill weeds and freshen the soil.
2. Bed in the fall. Reverse rows in spring. Knock off rows and plant.
3. Bed, knock off and plant in spring in one continuing operation.

It is not considered best to grow winter legumes on "buckshot" soils ahead of cotton.

Where cotton follows corn and soybeans or soybeans grown alone for seed, use the same methods as recommended for clay and silt loams, loams and sandy loams.

It is recommended that all the cotton land on the farm be flat-broken about every third year, the soil being broken as deep as possible without turning up the raw clay.

#### D. Fertilization.

On alluvial soils, use 40 to 80 pounds of nitrogen per acre, applying before or at planting time or as a side dressing from either solid or liquid carriers. Where good yields of legume crops, 5 tons of green weight per acre or more, have been turned under, the nitrogen applications may be reduced 50 per cent. If the green weight of legume cover crops turned under ahead of the cotton is as high as 10 tons per acre, no fertilizer nitrogen needs to be added. Where available soil phosphorus is low, use 400 or more pounds per acre of 10-10-10, 10-8-4, 12-8-0, or 16-20-0 at or before planting. On alluvial soils where rust or potassium deficiency is prevalent, especially in the Ouachita, Bartholemew or Boeuf River bottoms and terraces, use 600 pounds of 8-8-8, 6-8-8 or 6-8-12 per acre or 400 pounds or more per acre of 12-8-12, 12-12-12 or 10-10-10



at or before planting.

On soils of Coastal Plain, Coastal Prairies and Pleistocene Mississippi Terraces and Loessial Hills, where rust is not prevalent, use 600 pounds per acre of 8-8-8, 10-10-10, 5-10-5, or 400 pounds per acre of 12-12-12 or 12-24-12. On these upland soils where rust is prevalent, use 400 to 600 pounds of 8-8-8, 10-10-10, 12-12-12, 6-8-8, 6-8-12, 5-10-10 or 3-12-12 per acre. If the initial application supplies less than 40 to 60 pounds per acre by side dressing. On Coastal Plain soils in the hilly areas having heavy, reddish subsoils, use 600 pounds per acre of 6-10-4, 5-10-5 or 300 pounds of 12-24-12.

In a cotton-lime test conducted by M. B. Sturgis and J. G. Marshall at the Louisiana Experiment Station on Olivier Silt loam at the Perkins Road Experimental Farm, Baton Rouge, 1.5 tons of dolomitic limestone per acre were applied in 1946. The soil pH was raised from 5.4 to 6.2 and is still holding at pH 6.0 after a period of 8 years.

The lime gave a profitable increase each year of the test. The average increase for the 6-year period of the test was 366 pounds of seed cotton per acre.

#### E. Cultivation

As soon as the cotton is up to a uniform stand it should be shallow-cultivated with a rotary weeder or weeding implement, except where a weed control chemical has been applied. The rotary weeder is recommended for tractors only and works best when run at from four to five miles per hour. Follow about one week later with the same implements. Thereafter give the cotton a shallow cultivation each week. Where flaming is used, it is more effective, if the surface of the bed is kept flat and free from clods.

The length of time the cultivation of cotton should be continued will depend upon the season. Continue cultivation until cotton has fruited or until the branches lap in cotton middles. Lay by on a slight bed.

The uses of pre-emergence and post-emergence chemicals for grass and weed control have been

introduced and are successful. Further information on this subject can be obtained from your local Agricultural Extension agent.

#### F. Provide organic matter through rotation

Where cotton follows cotton a winter legume should be grown, except on "buckshot" soils. For safest and best results the winter legumes must be planted early (September 15 to October 15). A good method is to plant after every one or two days of picking. The larger farms can be seeded by airplane, if desired.

Corn interplanted with soybeans will give about the same increase in cotton yields as winter legumes, provided a good stand and growth are obtained.

Corn and soybeans hogged-off will give about the same cotton increase as when they are turned under.

#### G. Control of diseases

Twenty plant diseases have been reported in Louisiana which are known to attack the cotton plant. They include fungus and bacterial blights, wilt diseases, bollrots, seedling diseases, leaf spots and such physiological diseases as "black rust" due to potassium deficiency, "red rust" due to magnesium deficiency and "crinkle leaf" caused by manganese toxicity in certain soils. In addition, three kinds of nematodes (the root knot, meadow and stubby root) are serious pests of the crop in some sections of the state, especially in the light sandy loam soils. While some of these diseases are of minor importance, several may cause serious losses annually, unless improved methods of control are employed.

Further information on this subject can be obtained from Louisiana Extension Publication 1132 or from Parish Extension Agent.

#### H. Control of insects

##### 1. Cultural methods of insect pest control.

- a. Eliminate good winter quarters of boll weevil.

- b. Destroy wild host plants.
  - c. Destroy old cotton stalks.
  - d. Plant early.
  - e. Use early fruiting, prolific varieties.
  - f. Build soil fertility.
  - g. Organize cotton crop into large blocks.
2. Chemical control of insect pests

Learn which poisons are recommended for the current season. Do this in April or May. County agents have a printed circular which contains the latest recommendations.

## Rice

### I. Introduction

#### A. Economic Importance

Rice is the most important food in the world. Although surpassed by wheat in total acreage for the world, as a whole, the volume of food produced by the world rice crop is 10 to 20 per cent greater than that of wheat. This paradox is due to the wider adaptation of the rice plant to varying climatic and soil conditions and the resulting yield per acre which is usually two to three times that of wheat. Rice supplies the major food requirements for more than one-half of the world's population and this single food item comprises 70 to 80 per cent of the entire calory intake in many countries.

It is produced under a wider variety of conditions and by more varied methods than any other major crop. Although it is considered by many to be a tropical hot-weather crop only, it is grown in Northern Japan and Korea, at the foothills of the Alps in Northern Italy, and along the lower reaches of the Andes in Southern Argentina and Chile under climatic conditions too severe for the production of corn, tomatoes, and similar temperate-climate crops. Even though

it is thought to be a sea-level, marsh-land crop primarily, it is planted at altitudes of 4,000 feet in Peru, 6,000 feet in the Republic of the Philippines, and as high as 10,000 feet in the Himalayas of India. In spite of the fact that it is considered to be an irrigated crop only, produced under completely flooded conditions in the United States and Europe, more than one-half of the world's annual rice crop is grown without artificial or controlled irrigation of any kind. Much of it is cultivated on rolling to hilly lands which would be considered too steep for tilled crops in the United States. Accordingly, a fundamental understanding of major differences in production, harvesting, marketing, consumption and trade is necessary before the historical statistical trends can be intelligently interpreted.<sup>31</sup>

According to figures<sup>32</sup> reported in 1953, Louisiana ranks second among the states in the United States in the production of rice. In the same year, the rice crop provided the farmers of this state with \$60,348,000 farm income. Only cotton exceeded this in farm income.

#### B. Areas of Production<sup>33</sup>

Since rice production is centralized in the southwestern portion of the state, the variation in rice producing areas of the state does not justify separation on a production basis.

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<sup>31</sup>John Norman Efferson, The Production and Marketing of Rice (New Orleans, Louisiana: Simmons Press, 1952), p. 2.

<sup>32</sup>Montgomery, op. cit., pp. 15-18.

<sup>33</sup>L. C. Hill, Associate Agronomist, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, September 7, 1955.

## II. Efficiency standards and production goals

Table II.--Production Goals for the Rice Enterprise.<sup>34</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Production per acre (bbls.)	15	30
2. Pasture rotation (the degree to which the recommendations of the experiment station are followed expressed in per cent)	20	100
3. Fertilization (same as above)	40	100
4. High quality seed (same as above)	60	100
5. Land leveling (same as above)	75	100

The figures in this table are studied estimates by the authority cited.

## III. Approved practices recommended for attainment of production goals<sup>35</sup>

(The material below was taken only in part from the source indicated.)

### A. Pasture rotation

The two years rice and three years improved pasture rotation appears at this time to be the

<sup>34</sup>Hill, Interview, September 7, 1955.

<sup>35</sup>R. A. Wasson and R. K. Walker, "Louisiana Rice," Extension Publication 1182, Louisiana State University, Baton Rouge, Louisiana, March 1955.

rotation that will do the best job and pay the largest profits.

Although there are fewer acres of rice with this system than with the one-one systems, rice production and sales are considerably larger. This is due to the high yield per acre of rice (20 barrels versus 12 barrels), which can be expected as a result of the longer rotation and the practices applied on pastures. Beef production with the two-three system is about 5 times more than from the one-one system.

#### B. Fertilizing

Where rice is watered properly and weeds are well controlled, increased yields resulting from fertilization vary from 3 to 8 barrels per acre. Drilling fertilizers both below the seed and with the seed have proven to be good practices.

The best response with various soil conditions of the Coastal Prairies have been obtained with applications of 30 to 60 pounds per acre of N, 20 to 40 pounds per acre of  $P_2O_5$  and 0 to 40 pounds per acre of  $K_2O$ .

These amounts may be applied in the 8-8-8, 10-10-10, 12-12-12, 13-13-13, 10-10-5, 10-5-10, 10-10-0, 5-10-5, 6-10-4, 6-12-6, 10-20-10 and 12-24-12 grades of fertilizer. Such grades as 6-10-4, 5-10-5, 10-10-0 and 16-20-0 are better adapted to the heavier and darker colored silty clay loam and clay loam soils. Top dressings alone in the Coastal Prairies are not as effective as complete fertilizers placed directly with or below the seed. However, good results from top dressing with various nitrogen materials are being obtained where 200 to 300 pounds per acre of 4-12-8, 5-10-5 or 3-12-12 are drilled below or with the seed and this followed by top dressings of 20 to 40 pounds of nitrogen applied before booting stage.

On heavier soils, particularly on the alluvial soils, top dressing with 30 to 40 pounds of nitrogen per acre in various nitrogen carriers has given increases of 3 to 6 barrels per acre.

The effectiveness of nitrogen fertilization on rice may be evaluated on the basis that under

favorable conditions for response 4 to 5 pounds of nitrogen can be expected to increase the yield of rice 1 barrel per acre. The yield of rice can be increased as much as 6 to 8 barrels per acre by application of sufficient nitrogen when the other nutrients are present or added in adequate amounts.

#### C. Use of high quality seed

Quality seed rice should be pure, have high germination and be free of red rice, blackhull rice and weed seed of all kinds. The best assurance of high quality is the use of certified seed. Certified seed is produced from foundation seed by qualified seed rice growers under careful supervision and inspection procedures. Foundation rice seed is produced by the various experiment stations.

#### D. Land leveling

Many different types of land levelers are available. The majority give good results. Rice land should be leveled in order to:

1. Eliminate high and low places within a levee system.
2. Reduce the number of levees needed in a given field.
3. Reduce the amount of irrigation water required for growing the rice crop.
4. Provide a uniform depth of water which gives better weed control and a more uniform growth of rice.

### Sugar Cane

#### I. Introduction

##### A. Economic Importance

The sugar cane is a perennial grass, the cultivation of which is confined to the warmer regions of the earth. In all probability, it is of palaeo-tropical origin, and Eastern Asia is usually assigned as its home by economic botanists. Nevertheless the cane was found growing in Polynesia by the first European visitors, and also in the Hawaiian Islands... It would then appear that the cane is indigenous

equally to the South Pacific as to Eastern Asia.

The cane plant is made up of the root and root stock, the stalk, the leaf, and the inflorescence.<sup>36</sup>

Sugar cane is one of Louisiana's oldest major farm enterprises. According to available statistical records,<sup>37</sup> this state is currently and has been the leading producer of cane for sugar and syrup. Further, sugar cane for sugar ranks fourth,<sup>38</sup> among farm enterprises in contribution of farm income to the farmers of this state. Cash receipts from marketings of sugar cane for sugar in Louisiana in 1953 were \$41,839,000.<sup>39</sup>

#### B. Areas of production<sup>40</sup>

Because of differences of soil types and production capacity, the state is divided into

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<sup>36</sup>Noel Deerr, Cane Sugar, Second Edition (London: Norman Rodger, 1921), p. 1.

<sup>37</sup>Montgomery, op. cit., p. 15.

<sup>38</sup>Ibid., p. 16.

<sup>39</sup>Ibid., p. 18.

<sup>40</sup>Denver Loupe, Associate Agronomist, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, July 27, 1955.



production areas which are designated as follows:

Area I -- Bayou Lafourche.

Lafourche, Terrebonne, and Assumption  
Parishes.

Area II -- Mississippi River.

St. Charles, St. John, St. James,  
Ascension, Iberville, and West Baton  
Rouge Parishes.

Area III -- Bayou Teche.

St. Mary, Iberia, Lafayette, St.  
Martin, and Vermillion Parishes.

Area IV -- Bunkie-Alma.

Avoyelles, Rapides, St. Landry,  
Pointe Coupee, and West Feliciana  
(Angola) Parishes.

## II. Efficiency standards and production goals

Table III.--Production Goals for the Sugar Cane Enterprise.<sup>41</sup>

Efficiency Factors	Efficiency Standards				Production Goals			
	Land Area				Land Area			
	I	II	III	IV	I	II	III	IV
1. Production per acre (bushels)	26.9	24.8	19.4	19.2	35	35	30	30
2. Proper variety (Degree to which Experiment Station recommendations are followed expressed in per cent)	(Figures not available)				100	100	100	100
3. Proper planting (Same as above)	60	60	60	60	100	100	100	100
4. Fertilization (Same as above)	80	80	65	70	100	100	100	100
5. Weed control (Same as above)	60	70	35	45	100	100	100	100
6. Borer control (Same as above)	60	60	70	60	100	100	100	100

The figures in this table are studied estimates of the authority cited.

<sup>41</sup>Loupe, Interview, July 27, 1955.

### III. Approved practices recommended for attainment of production goals<sup>42</sup>

(The material below was taken only in part from the source indicated.)

#### A. Drainage

Good drainage requires turtle backed cuts, clear and sufficient quarter-drains.

#### B. Land preparation

Depth would depend upon the soil type, available cultivation power and the depth of the sub-soil. Considering these factors, depth is desirable. The rotation should be adapted to the individual farm, depending upon such factors as weed control, need for organic matter, etc.

#### C. Fertilizer

##### Plant cane

On all plant cane except where large crops of legumes have been turned under prior to planting, apply at least 40 to 60 pounds of nitrogen per acre, using any of the common carriers. Where the green weight of the legumes turned under ahead of planting cane is as much as 8 to 10 tons per acre, it is not necessary to fertilize plant cane.

##### Stubble cane

On stubble cane, on the medium-to-heavy textured alluvial soils of the Mississippi River bottoms, apply 80 to 100 pounds of nitrogen per acre. Where known deficiencies of phosphorous and potassium exist -- usually in the very fine sandy loam and silt loam types -- use 25 to 40 pounds of  $P_2O_5$  and 40 to 60 pounds of  $K_2O$  in addition to nitrogen. In some cases, supply plant food with 500

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<sup>42</sup>Loupe, Interview, July 27, 1955.

pounds of 6-8-12, 10-5-10 or 0-10-20 per acre, supplementing the 30 to 80 pounds of nitrogen from either solid or liquid materials.

To stubble cane on the medium-to-light textured soils of the Pleistocene Mississippi terraces (Lintonia, Richland, Olivier, Calhoun, Patoutville, Jeanerette, Iberia, Cypremort and Baldwin soil types), apply 80 to 100 pounds of  $P_2O_5$  and 40 to 60 pounds  $K_2O$ .

#### D. The proper variety

Recommendations by areas are as follows:

1. Avoyelles, Rapides, upper St. Landry and Point Coupee Parishes:
  - a. All soils-C. P. 44-101 and N. Co. 310/1.
  - b. Light soils-C. P. 36-13 for early harvesting and C. P. 36-105 for later harvest.
2. East and West Baton Rouge, Iberville, Ascension, lower Point Coupee and St. Landry Parishes:
  - a. All soils-C. P. 44-101 and N. Co. 310/1.
  - b. Light soils-C. P. 36-13 and C. P. 44-155/2 for early harvesting; C. P. 36-105 for later harvesting.
3. Assumption, St. James, St. John, St. Charles, Lafourche and Terrebonne Parishes:
  - a. All soils-C. P. 44-101 and N. Co. 310/1.
  - b. Light soils-C. P. 36-13, C. P. 43-47 and C. P. 44-155/2 for early harvesting; C. P. 36-105 for later harvesting.
4. St. Mary, Iberia and St. Martin Parishes:
  - a. Light soil-C. P. 36-13, C. P. 43-47 and C. P. 44-155/2 for early harvesting.
  - b. All soils-C. P. 44-101 and N. Co. 310/1.
  - c. Mixed and heavy soils-C. P. 44-154/3.
5. Lafayette, Vermillion and Terrace soils in St. Landry Parish:
  - a. All soils-C. P. 29-116/4, C. P. 44-101 and N. Co. 310/1.
  - b. Light soils-C. P. 36-13, C. P. 44-155/2 for early harvesting.
  - c. Mixed and heavy soils-C. P. 44-154/3.

- E. Planting preparation of seedbed is generally started in late August and early September... If legumes are grown without corn, the land can be prepared weeks earlier.

Under present practice, fall is most suitable to plant -- from about September 20 to October 15 or November 1.

A much higher increase in the rate of germination can be obtained by planting well in advance of the regular fall planting season. Planting during early August usually gives 40 to 50 per cent germination. Wintering of borers is a disadvantage of summer planting. Summer planting of the entire crop is not recommended. Large growers can best follow the practice of summer planting.

In planting, place the cane at a level higher than that of the bottom middles... Make coverage uniform... Don't plant too shallow... A covering of 4 inches of packed soil is sufficient to protect seed cane against winter weather.

#### F. Cultivation

Early spring work, or that done as soon as weather conditions permit, aims at obtaining an adequate stand of cane.

Usually the next operation is shaving. Shaving is used when necessary for obtaining good stands. Opinions differ in regard to the practice. Shaving should not be used habitually, but only practically and intelligently.

Off-barring is removing dirt from the sides of the cane row by off-barring and hoeing mechanically. The remaining part of the row of cane then warms up faster and shoots develop more rapidly.

Do not use the stubble digger if weather conditions are unfavorable. When necessary, use it early in the season. Use mechanical hoes for removing dirt on both plant and stubble cane.

#### G. Weed control

Follow the recommendations of the Louisiana

## Agricultural Experiment Station.

### H. Borer control

Follow the recommendations of the Louisiana Agricultural Experiment Station.

## Corn

### I. Introduction

#### A. Economic importance

From earliest times kings have been looked upon as being royal and thus deserving of special consideration. Among the crops grown by the farmer, corn is royal and is often spoken of as the king of crops. Its use in the early history of our country as an important article of food is well known. Today, corn is used extensively for animal feeding and in many of the industries. Since it is truly a new world crop of great importance, its history is of special interest to all Americans.

Corn, or maize as it is sometimes called, is believed to have had its origin in Central or South America. Historians are not in agreement, but it is known that teosinte (*Euchlaena Mexicana*) and gama grass (*Tripsacum dactyloides*), close relatives of corn, are found in the wild state in these regions. Most botanists believe that corn, as we know it today, originated independently of any other known species of plants. It is possible, as suggested by some investigators, that corn and its two semi-tropical relatives originated from a common ancestor. In gama grass the seeds are borne in a tassel resembling that of corn. Teosinte resembles corn more closely, producing a branched type of ear.

When the white man first came to this country, he found that the natives were growing corn for a food plant. The Indians had learned to depend upon corn for their food and were farsighted enough to fertilize the plants to secure higher yields. Also a bumper crop was stored to provide food during a period when food was likely to be scarce.

Corn in this country refers to the botanical group *Zea Mays*. In Europe the term corn is applied to all the cereals and what we know as Indian corn or maize. "Zea" is from the Greek name of a cereal, and this is, in turn, derived from a verb meaning "to live." This derivation is in accord with Indian nomenclature, many versions of their word for maize meaning, "that which sustains."<sup>43</sup>

In the state of Louisiana corn is not considered one of the most important cash crops despite the fact that more farms produce corn than any other single crop. According to figures presented by J. P. Montgomery,<sup>44</sup> Louisiana ranked 27th in the production of corn in 1953, when compared to the other states. The total acreage of corn in the state was listed as 806,000 acres. Compared to the acreages of other crops, corn was surpassed only by cotton. However, corn's rank,<sup>45</sup> according to farm income was 20th. This wide variation between acreage and farm income indicates two things: (1) A large portion of the corn crop is consumed on the farm, and

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<sup>43</sup>Andrew Bass, and others, American Farming, Agriculture I. (St. Paul, Minnesota: Webb Book Publishing Company, 1939), pp. 139-140.

<sup>44</sup>Montgomery, op. cit., p. 15.

<sup>45</sup>Ibid., p. 16.

(2) average production per acre is low.

B. Areas of production<sup>46</sup>

Area I -- Alluvial soils of Mississippi, Red,  
Black, Ouachita, and Atchafalaya  
Rivers

Area II -- Bluff, terrace, and prairie soils

Area III -- Upland hills

II. Efficiency standards and production goals

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<sup>46</sup>A. G. Killgore, Associate Extension Agronomist,  
Division of Agricultural Extension, Interview, Louisiana  
State University, August 17, 1955.



Table IV.--Production Goals for the Corn Enterprise.<sup>47</sup>

Efficiency Factors	Efficiency Standards				Production Goals			
	Land Area				Land Area			
	I	II	III		I	II	III	
	Stan. Row	Cane Row			Stan. Row	Cane Row		
1. Production per acre (bushels)	35	25	20	16	100	85	75	65
2. Plants per acre	8,000	4,800	7,200	6,000	12,000	12,000	9,000	8,000
3. Spacing between hills (inches)	18	18	20	24	12	8	16	18
4. Number of plants per hill	1	1	1	1	1	1	1	1
5. Amount of nitrogen used (The degree to which Experiment Station re- commendations are followed in terms of per cent)	50	75	50	50	100	100	100	100
6. Variety (Same as above)	50	60	45	40	100	100	100	100

The figures in this table are studied estimates by the authority cited.

<sup>47</sup>Killgore, Interview, August 17, 1955.

### III. Approved practices recommended for attainment of production goals<sup>48</sup>

(The material given below was taken in part from the source cited.)

#### A. Selection of good land

Corn, due to its extensive though comparative shallow root system, requires a good, deep, well-drained, and mellow soil, well supplied with organic matter to produce heavy yields of grain. Thin, eroded and poorly drained land will not produce profitable yields of corn. Corn is a crop that requires an ample supply of plant food for good yields and if this food is not already in the soil, it must be supplied by the grower.

#### B. Seedbed preparation

The second factor in good corn production, seedbed preparation, is very frequently undervalued in Louisiana. With corn, especially, this is a matter of the utmost importance. To be good the seedbed should be deep, well-pulverized, and very thoroughly cultivated before the planter goes into the field. In the alluvial sections there has been a tendency for the soil to pack and form hardpan at plow-depth. This hardpan reduces the plant root penetration in the soil and results in less plant food and water for the growing plant. Where these hardpans exist, they should by all means be destroyed, which can be done by increasing the depth one or two inches and then followed by varying the depth of plowing slightly from year to year. To do a good job an ample supply of organic matter worked into the soil and thoroughly mixed with it is also very important. This is one of the ways by which bad weather conditions, sure to appear later in the season, may be overcome. To a much larger extent than most farmers realize, the yield of corn is determined at this time.

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<sup>48</sup>R. A. Wasson and A. G. Killgore, "Louisiana Corn," Agricultural Extension Publication 1042, Louisiana State University, Baton Rouge, Louisiana, March, 1950.

On hill soils slightly higher yields have been obtained from plantings made in the "water furrow" than from plantings made on ridges and on the level.

On flat alluvial or other flat or nearly flat land, as a general rule, slightly higher yields have resulted from planting on low ridges.

### C. Good seed

Good seed is the third factor to be considered for best corn yields.

North Louisiana is considered to be the part of the state north of Alexandria, while the area south of Alexandria is referred to as South Louisiana.

#### North Louisiana:

Dixie 11	(white)	Dixie 18	(yellow)
La. 468	(white)	*N.C. 27	(yellow)
Coker 811	(white)	*Dixie 22	(yellow)
Funk G-785	(white)	Funk G-714A	(yellow)
		Funk G-710	(yellow)

#### South Louisiana:

La. 521	(white)	Dixie 18	(yellow)
Funk G-792	(white)	Funk G-737A	(yellow)
		Funk G-740	(yellow)

When selecting the variety of corn to grow, one would consider in addition to adaptation the use for which the corn is intended.

### D. Proper cultivation

Cultivate as often as is necessary to control weeds, taking care not to damage the root system with deep cultivation.

### E. Spacing

	Standard Row	Cane Row
Alluvial soils	1 plant per 12"	1 plant per 8"
Bluff, terrace and prairie soils	1 plant per 16"	

Upland hills

1 plant per 18"

#### F. Proper fertilizer

On heavier and more fertile alluvial soils, use 100 pounds of nitrogen per acre. If weeds are a special problem, about half of the nitrogen may be applied before or at planting and the remainder as a side dressing before the corn is knee high. Stands should contain 9,000 to 14,000 plants per acre.

On soils of Coastal Plain, Coastal Prairies, Pleistocene Terraces and Hills and lighter alluvial soils use 400 to 500 pounds per acre of 8-8-8, 5-10-10 or 5-10-5 or their equivalents in higher grades before or at planting and side dress with 50 to 80 pounds of nitrogen. Corn on these soils requires from 70 to 100 pounds per acre of N, 25 to 50 pounds of  $P_2O_5$  and 25 to 50 pounds of  $K_2O$ . Stands should contain at least 9,000 plants per acre.

### Sweet Potatoes

#### I. Introduction

##### A. Economic importance

Normally approximately 100,000 acres of sweet potatoes are grown in Louisiana and the value has ranged from \$11,000,000 to \$17,783,000 annually for the years 1945 to 1952. The largest acreage grown in the state was in 1943 when 124,000 acres were produced. Since 1918 the smallest acreage ever grown was in 1924 when only 50,000 acres were grown. The highest farm value to be placed on this crop was in 1945, when it reached \$17,783,000.<sup>49</sup>

The sweet potato industry ranks eighth<sup>50</sup>

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<sup>49</sup>John A. Cox, and Weston J. Martin, "Louisiana Yams for Table and Trade," Agricultural Extension Publication 1121, Louisiana State University, Baton Rouge, Louisiana, August, 1952, p. 2.

<sup>50</sup>Montgomery, *op. cit.*, p. 16.

in comparison to other crops in farm income for the farmers of this state.

#### B. Areas of production

Sweet potatoes are grown commercially in 42 of Louisiana's 64 parishes but the greatest volume is produced in southwest Louisiana, in St. Landry, Lafayette, Acadia, St. Martin, Evangeline, Jefferson Davis, Avoyelles, Rapides and Allen Parishes. A large acreage is planted also in West Feliciana Parish and small acreages are produced in Tangipahoa, Livingston, East Feliciana, Washington, St. Helena and East Baton Rouge Parishes.

Northeast and North Louisiana plantings are concentrated in West Carroll, Richland, Franklin, Union, Claiborne, Ouachita, Bienville, Caddo, DeSoto, Webster and other parishes.<sup>51</sup>

For the purposes of this study, the state will be divided into two general land areas -- alluvial and upland hill. In the opinion of Cox and Montelaro<sup>52</sup> the difference in production between these two soil types is significant.

#### II. Efficiency standards and production goals

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<sup>51</sup>Cox and Martin, op. cit., p. 2.

<sup>52</sup>John A Cox, Horticulturist, and Joseph Montelaro, Associate Horticulturist, Interview, Division of Agricultural Extension, Louisiana State University, Baton Rouge, Louisiana, August 29, 1955.

Table V.--Production Goals for the Sweet Potato Enterprise.<sup>53</sup>

Efficiency Factors	<u>Efficiency Standards</u>		<u>Production Goals</u>	
	<u>Land Area</u>		<u>Land Area</u>	
	I	II	I	II
1. Production per acre (bu.)	100	150	150	200
2. Grades				
U. S. No. 1	60	60	60	60
U. S. No. 2	25	25	25	25
U. S. Culls	15	15	15	15
3. Fertilization (The degree to which Experiment Station recommendations are followed expressed in per cent)	80	80	100	100
4. Insect control (same as above)	100	40	100	75
5. Disease control (same as above)	40	40	75	75
6. Recommended variety (same as above)	80	80	90	90
7. Selecting good seed (same as above)	50	50	80	80

The figures in this table are studied estimates of the authority cited.

### III. Approved practices recommended for attainment of production goals<sup>54</sup>

<sup>53</sup>Cox and Montelaro, Interview, August 29, 1955.

<sup>54</sup>Cox and Martin, op. cit., pp. 5-29.

(The material given below is taken only in part from the source cited.)

A. Seed selection

Selection and care of seed stock is probably the most important practice involved in profitable sweet potato production. To maintain a good supply of planting stock:

1. Grow seed stock from vine cuttings preferably planted in June on disease-free soil.
2. Select seed stock when your main planting from vine cuttings is harvested. Highest yields are produced from draws grown from foundation seed stock.
3. Harvest seed stock before frost.
4. Maintain a good supply of foundation seed stock, which is the seed stock from which seed potatoes will be grown another year. Suggest one bushel of certified seed (per five acres grown) should be planted every year to build up quality and cut down diseases.
5. For foundation seed stock select hills producing at least 4 U. S. No. 1 sweet potatoes. These yams should be free from disease and weevils and have a copper colored skin and an orange or salmon pink flesh. They should be well shaped.
6. Check the flesh color by cutting off about one-half inch from the end nearer the plant (stem end). Check only one root in each hill for flesh color. If it has poor color, discard the entire hill.
7. From 4 to 6 bushels of foundation seed stock are required to plant one acre but it is wise to harvest and store 10 bushels for each acre you expect to plant next year.
8. Handle seed stock with cotton gloves and as though they were eggs.
9. Never let seed stock remain in the field unprotected from the sun more than one hour after they are dug. Cover the potatoes with

vines to protect them from the sun after placing them in crates.

10. Do not store seed stock with sweet potatoes to be eaten or sold for table use.

11. In Sweet Potato Weevil Control Area:

- a. Select seed potatoes that are apparently free of weevils.
- b. Dust each crate of seed sweet potatoes with 10% DDT dust as they are stored.
- c. Place the seed potatoes in storage at 85° F. or above for at least 2 weeks.

#### B. Adapted variety

Several varieties are grown in Louisiana. You should select the one adapted to your area and needs, remembering always that Good Seed Is Half The Crop. Varieties and seedlings listed below should be studied closely before a choice is made:

The Unit I Porto Rico is still recommended as the main variety to plant. This variety is rather consistent in its performance year after year; therefore, the major portion of one's crop should be planted in this potato.

Goldrush (L-241) is a new variety, which has a copper-colored skin and a bright orange-colored flesh. The inside color is much better than that of Unit I. Goldrush yields slightly less but does not crack as much as Unit I does. This variety tends to vein slightly under certain conditions. Goldrush is highly resistant to wilt.

In selecting the variety, the farmer will have to take other things into consideration such as market demands, etc.

#### C. Fertilizer

From 500 to 800 pounds of 4-12-8, mixture or equivalent, depending on the fertility of the soil, should be applied a week to 10 days before setting plants. In most instances you can expect about 33 1/2 per cent more No. 1 potatoes per acre from fertilized land than from unfertilized land. On this basis, two



acres of fertilized potatoes will yield as much as three acres of unfertilized ones. Sweet potatoes do best when they follow a crop of corn and soybeans or winter legumes that have been turned under well in advance of setting plants.

#### D. Harvesting, Grading and Packing

Harvest sweet potatoes intended for storage before frost. The crop should be harvested with a large turn plow or mechanical sweet potato digger. If a large turn plow is used, plow deeply in order to avoid cutting the potatoes. They should be handled with the greatest care and should not be pitched into large piles. Probably more potatoes are lost by growers as the result of careless handling than from all other causes. Do not allow the potatoes to remain overnight in the field or in the hot sun over 60 minutes. They can be graded partially as they are picked up in the field. Culls and injured potatoes should be picked up separately and stored in the crates into which they are first placed. Careful handling from the field to the storage house will prevent bruising.

#### E. Insect control

For current information concerning this approved practice, refer to your local county agricultural extension agent.

#### F. Disease control

Sweet potato growers and shippers experience losses from sweet potato disease. These losses result from reduced yields of marketable potatoes; from spoilage in transit, on the market and in storage; and indirectly from a poorer quality product. The destruction caused by sweet potato diseases can be reduced greatly by following certain practices outlined in Agricultural Extension Bulletin 1121.

Some 20 different diseases have been observed on sweet potatoes in this state. Considerable damage is caused by at least five diseases, namely, black rot, stem rot or wilt, soil rot, scurf and soft rot. Internal cork is serious in many areas.

## Strawberries

### I. Introduction

#### A. Economic importance

The strawberry is one of our best native fruits. It was found growing wild on our mountains and in our valleys by the earliest settlers. The native sorts have been improved both by American as well as by European growers. Many of our first good varieties are said to have been sent to America from Europe, where they were first developed from our native plants.<sup>55</sup>

Louisiana's commercial strawberry acreage is located in the southeast section of the state, but strawberries can be grown in almost any section of the state. This state grows strawberries commercially for the early market. Carlot movements usually begin in late March. When "over-ripes" are abundant, and during the latter part of the season, a large portion of the crop is stemmed for freezing.

Strawberries have been grown commercially in Louisiana for over seventy years. In the Tickfaw area, a few are reported to have been grown for sale even before 1860.

If growers are to continue producing strawberries profitably, they will have to grow a high quality fruit at a much lower cost. The industry was originally built around Klondike, a variety which was developed in Louisiana. Development of new varieties of high production and quality that are especially adapted to shipping fresh, freezing and pre-serving is the main objective of the breeding program at the Louisiana Experiment Stations.<sup>56</sup>

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<sup>55</sup>George W. Hood, Horticulture, Third Edition (Philadelphia, Pennsylvania: Lea & Febiger, 1929), p. 187.

<sup>56</sup>John A. Cox, and W. F. Wilson, Jr. "Louisiana Strawberries," Extension Publication 1096, Louisiana State University, Baton Rouge, Louisiana, 1951, p. 2.

## B. Economic importance to the state

On the basis of statistics<sup>57</sup> presented by the Louisiana Agricultural Experiment Station, the strawberry enterprise is ranked 11th among all other farm enterprises in the state on its contribution to farm income. It is our largest producer of farm income in the fruit and tree nut group. Also, according to the above statistical data, Louisiana farmers collected a gross income from Strawberries of \$7,150,000 in the year 1953.

## C. Areas of production<sup>58</sup>

There is no significant difference in production of strawberries according to the yield per acre in any general area of production in the state. As stated previously, the majority of the strawberries produced commercially in this state are produced in the southeast section.

## II. Efficiency standards and production goals

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<sup>57</sup>Montgomery, op. cit., pp. 16-18.

<sup>58</sup>Cox and Montelaro, Interview, August 29, 1955.

Table VI.--Production Goals for the Strawberry Enterprise.<sup>59</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Production per acre (crates, 24-1 pts.)	100	200
2. Insect control (Degree to which Experiment Stations recommendations are fol- lowed expressed in per cent)	60	85
3. Fertilizer (Same as above)	75	100
4. Weed Control (Same as above)	50	90
5. Irrigation (Same as above)	95	100

The figures in this table are studied estimates of the authority cited.

### III. Approved practices recommended for attainment of production goals<sup>60</sup>

(The material below was taken only in part from the source indicated.)

#### A. Plant production

As soon as the harvest is over, remove pine straw by raking it up in piles, being careful not to injure the plants. Pile it on the headlands and burn. While the straw is burning,

<sup>59</sup>Cox and Montelaro, Interview, August 29, 1955.

<sup>60</sup>Cox and Wilson, op. cit., pp. 2-16.

dig up all diseased plants and burn them also.

If the single-row method of spacing plants has been used, destroy every other row by plowing and by smoothing the original ridges with a harrow. Leave rows of remaining mother plants about six or seven feet apart. If the double row has been used, one row on each ridge should be plowed up, leaving single rows four feet apart. Clean the surface of the row between mother plants with a hoe, pulling off dead leaves. Top dress with 100 pounds of nitrate of soda, or sulphate of ammonia per acre about June 1. Follow this with another similar treatment about June 15. Pinch soil over the runner plants, spacing them evenly around the mother plant. Irrigate the mother beds in the late afternoon to maintain moisture. You can continue to irrigate and pinch soil over runner plants as they develop, or as is necessary. Lay off a fresh piece of ground in six-foot ridges in time to have it well pulverized and settled for planting soon after harvest in the spring. As soon as the first plants are formed and rooted, dig them up and transplant to these newly prepared rows. Treat as explained above. This method is convenient in that you can control weeds and grass more easily. Some growers set out "button" plants in winter and transplant to the field the following June on freshly prepared rows about 6 feet apart. They set plants about 15 to 18 inches apart in rows.

Remember this: The first plant produced by the mother plant will usually give higher yields, number two plant is second and the mother plant third. The reason for this is that the one next to the mother plant has more time to develop a good root system, and to grow into a strong healthy plant.

Select plants with well-developed crowns, extensive root system containing white roots, and short-leaf stems. Do not use stunted under-developed, or dark rooted plants.

#### B. Fertilization

About two weeks before setting the plants in the field, distribute fertilizer in the beds, using from 900 pounds on light soil (Independence

area), to 1500 pounds per acre on heavier soils (Ponchatoula area). Use 4-12-4 or 5-10-5. Work it well into the soil by using a rake-type cultivator, disk or any suitable tool so that the strawberry roots will not come in direct contact with the fertilizer. You should apply fertilizer so that it will be directly under berry plants in the row. Some seasons you can expect high yields if you apply 700 pounds of fertilizer in the row before setting plants, and then apply 700 pounds as a top dressing when you scrape and straw your berries in early January. This requires extra labor, but test-plot yields indicate that it might well become a common practice in the future.

#### C. Insect control

A mite and not an insect, the red spider, is the most common and most injurious pest on strawberries in Louisiana. Although red spiders are nearly always present on the plants during the fall and winter, the greatest portion of the damage occurs in the spring. It is most severe after mild winters with light rainfall.

Sulphur dust (superfine dusting sulphur) is best known remedy for combating this pest on strawberries under Louisiana conditions. The sulphur can be used either undiluted or thoroughly mixed with from 10 to 20 per cent of hydrated lime. From 30 to 40 pounds of the dust per acre should be used for each application on single rows.

Plant beds should be dusted in the fall with sulphur, covering the foliage as well as possible. This is the most economical method of controlling the red spider under Louisiana conditions. Plant bed control prevents the spider from being distributed over a large area.

There are several other insects which affect the strawberry crop in Louisiana. For further information concerning these insects contact your County Agent and get Extension Circular No. 18, "Strawberry Insects."

#### D. Disease control

##### Leaf diseases:

The two major leaf diseases are leaf spot and leaf scorch. They may be controlled by spraying, sanitation, and use of resistant varieties.

All leaf blights can be controlled by spraying with 2-2-50 Bordeaux Mixture. Begin the spraying the latter part of January and spray about every 10 days until the fruit begins to ripen. It is also advisable to spray the plant beds in late summer and fall. If the plant beds have been sprayed so that the fall planting has been made with healthy plants, the winter spraying may be delayed until about the middle of February. Fixed copper compounds such as Tribasic Copper, 'Spray' Cop, etc., have given as good control as Bordeaux. Follow directions on containers.

Since the two main leaf blights, the leaf spot and the leaf scorch, do not spread very rapidly during the hot summer months, these can be almost completely eliminated from the plant bed by sanitary measures. In early June, the plants that have been selected for plant production should be gone over carefully and all the old, spotted leaves should be removed and burned. This procedure should be repeated once or twice during the summer. This method of obtaining clean plants is especially effective with isolated small patches in home gardens.

The Klonmore (630) variety, which was developed by the Louisiana Agricultural Experiment Station, is highly resistant to both the leaf spot (rust) and the leaf scorch. It is not necessary to spray this variety. The Konvoy and Marion Bell are also highly resistant to these diseases.

##### Crown Rot

There is no practical method of control of crown rot.

### Dwarf

Even though dwarf is not a serious disease in Louisiana because the diseased plants recover during the winter and produce fruit in the spring, it causes injury to plants and reduces yields to a certain degree. The disease can be easily kept in check by digging up and destroying the diseased plants during the summer and early fall.

### Berry rots

Warm wet weather, especially if prolonged for several days, is very favorable for the development of berry rots. When such weather prevails during harvest, the losses from fruit rots are tremendous. Rots destroy the berries in the field and affect the market price of the fruit as they continue to develop in transit. On the other hand, if cool, dry weather prevails during the picking season, losses from rots are negligible.

Gray mold, tan rot, and leather rot are the berry rots most common in Louisiana.

Berry rots are difficult to control. The fungi causing these rots live in the soil and on dead plant parts. Spraying has been tried and it has given a certain degree of control, but it is impractical to spray when the fruit is ripe or nearly ripe, because of the objectionable spray residue. Heavy mulching, so that the fruit will be kept high above the ground and well ventilated, is the most practical means of keeping the losses from fruit rots to a minimum.

### E. Variety

The grower should plant the variety of strawberries best adapted to his farm condition.

Klonmore--Recommended for commercial purposes in South Louisiana only. It is a high yielder, of excellent table quality, and a good shipper, and does not have to be sprayed for leaf spot and scorch control. It is an early producer and also bears a late crop, which is desirable for the quick-freeze trade. For best results plants should be set in the



field around the first of November. Klonmore does not produce satisfactorily when planted north of Baton Rouge.

Marion Bell--This variety has not been grown extensively as yet. Fruit of the Marion Bell has a brighter gloss than that of the Klonmore or the Konvoy, giving it the appearance of being waxed. The plant is open and its foliage is not so dense as that of the Klonmore. This allows the sun to shine on fruit and possibly reduces fruit rots. It outyielded the Klonmore significantly five years out of six (1945-1950). The Klonmore out-yielded it in 1950. It is resistant to leaf spot and scorch.

Konvoy--Recommended for home gardens in Louisiana. A cross between Klondike and Fairmore. It has bright red glossy fruit, is a heavy fruiter with vigorous growth. It ripens early and is a good stemmer. It has outyielded all other Louisiana varieties. It does not require spraying to control leaf spot and scorch.

Klondike--This strawberry has proved its worth but now is being largely replaced by superior varieties bred at the Louisiana State University Agricultural Experiment Station.

In tests conducted for the past several years, the seedling L-27 has out-yielded all named varieties.

#### F. Irrigation

Strawberries should be irrigated if dry weather prevails and there is not enough moisture. Furrow-irrigation is recommended for Louisiana. Run water down the middles and let it soak into the beds to supply water to freshly set plants and to plants that suffer from lack of water during extended dry seasons. This irrigation is necessary in summer for production of plants. The land must be graded properly so that water will not stand in low places. Water should not be allowed to cover plants on the bed. Apply water slowly down the middles in order to prevent washing of soil and to keep beds from caving.

## Shallots

### I. Introduction

#### A. Economic importance

Shallots are said to have first been found in the Eastern Mediterranean area. There are two commercial types of shallots grown in Louisiana. These are generally known as pin-leaved and flat-leaved types.<sup>61</sup>

According to Montgomery,<sup>62</sup> Louisiana farmers received \$1,553,000 from the sale of shallots in the year 1953. This was the highest farm income recorded from the sale of shallots during the years 1937-1953. Income from the enterprise is variable compared to other crops due to the instability of the price received.

#### B. Areas of production

Louisiana produces approximately 90 per cent or more of the shallots grown in the United States. The carlot shipments total from 700 to 1,000 cars each year. Parishes growing shallots are Lafourche, St. Charles, St. James, St. John, St. Bernard, Jefferson, Orleans, Terrebonne, Iberville, Avoyelles, Tangipahoa, and Plaquemine.<sup>63</sup>

### II. Efficiency standards and production goals

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<sup>61</sup>Joseph Montelaro, and E. C. Tims, "Louisiana Shallots," Agricultural Extension Publication 1051, Louisiana State University, Baton Rouge, Louisiana, April 1950, p. 1.

<sup>62</sup>Montgomery, op. cit., p. 62.

<sup>63</sup>Montelaro and Tims, loc. cit.

Table VII.--Production Goals for the Shallot Enterprise.<sup>64</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Production per acre (bbls.)	30	40
2. Seed source (Degree to which Experiment Station recommendations are followed expressed in per cent)	40	75
3. Fertilization (Same as above)	75	100
4. Insect control (Same as above)	15	80

The figures in this table are studied estimates by the authority cited.

### III. Approved practices recommended for attainment of production goals<sup>65</sup>

(The material below was taken in part from the indicated source. According to the authority cited, these approved practices are subject to continuous change.)

#### A. Good seed stock

Buy dry sets or green plants (according to season) free of pink root and other diseases.

#### B. Fertilizer

Use from 400 to 600 pounds of 5-10-5 or 8-8-8 fertilizer per acre. A week or 10 days before transplanting, open the row about 3 to 4 inches deep and distribute the fertilizer, mixing well with the soil. Rebed immediately. In order to keep the plants growing rapidly, sidedress during early growth once, or twice, with nitrate of soda, at the rate of 100 pounds per acre.

<sup>64</sup>Cox and Montelaro, Interview, August 29, 1955.

<sup>65</sup>Montelaro and Tims, op. cit., pp. 3-11.

### C. Insect control

Thrips are the worst insects on the shallot crop. The amount of damage varies from season to season, but some injury occurs almost every year in many areas. These insects are yellow to black in color and only about 1/25 of an inch in length. They have narrow fringed wings, and run and fly very fast.

In feeding, the thrips rasp the tissue of the plant and suck the juice. This causes the leaf to turn white. When the thrips attack is heavy, the leaves bleach out. Thrips damage is most severe when there is lack of moisture.

No entirely satisfactory control of thrips has yet been developed. While these insects are readily killed by contact insecticides, it is necessary that the spray come in direct contact with the pest. This is not readily accomplished by field spraying, because many of the thrips are well protected by the shallot leaves. Furthermore, these sprays do not affect the eggs, which are imbedded in the shallot leaf, and the pupae, which are found in the soil around the shallot plants.

Dust with 5% DDT, or spray with 2 pounds of 50% DDT wettable powder to 50 gallons of water. Begin the applications as soon as thrips injury appears and continue the treatments at weekly intervals. Caution-Stop treatment with DDT on shallots and onions to be sold or eaten as green onions three weeks before harvest. During these three weeks you can use tetraethyl pyrophosphate - better known as TEPP. Use according to the directions on the container. Read the label so you'll know just what precautions to take when this material is applied. It is one of the new organic phosphorus compounds and is considered dangerous to the person applying it, so all safety precautions should be observed.

### Irish Potatoes

#### I. Introduction

##### A. Economic importance to the state

The potato is the most important of all vegetables, about as important, indeed, as all the rest of the vegetables put together. Southerners call it the white or Irish potato to distinguish it from the sweet potato. It is one of the world's great food plants, especially in Europe and America. It grows well for home use, in its proper season, almost anywhere in the United States, and commercial areas are found in all regions. The south ships potatoes north in late winter and spring, and the north ships them south in the fall and winter, for this crop will not tolerate the heat and drouth of southern summers. Its suitability for storage without refrigeration contributes greatly to its usefulness.

The potato, though sensitive to frost, is a cool-season crop, a winter crop in the South. It develops best at temperatures of 65° to 70° F. Cool temperature and adequate moisture are especially important at tuber-setting time, when underground stems, called stolons, grow out, each to be tipped with a tuber. Thus, the tuber is a stem in contrast to the sweet potato which is a root.<sup>66</sup>

The farm value<sup>67</sup> of Irish potatoes to the farmers of Louisiana was \$1,098,000 in 1953. In this state potatoes are both a spring and fall crop. The spring crop is of the most importance economically.

#### B. Areas of production

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<sup>66</sup>Paul Work, Vegetable Production and Marketing (New York: John Wiley and Sons, 1945), p. 290.

<sup>67</sup>Montgomery, op. cit., p. 55.

According to Cox and Montelaro,<sup>68</sup> the difference in production in various areas of the state is not sufficiently uniform to justify division of the state into production areas.

## II. Efficiency standards and production goals

Table VIII.--Production Goals for the Irish Potato Enterprise<sup>69</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Production per acre (bushels)	75	200
2. Fertilizer (Degree to which Experiment Station recommendations are followed expressed in terms of per cent)	80	100
3. Disease control (same as above)	50	85
4. Varieties (same as above)	75	90
5. Spacing		
a. La Soda	1-12"-14"	1-8"-12"
b. Triumph and others	1-12"-14"	1-12"-12"

The figures in this table are studied estimates by the authority cited.

## III. Approved practices recommended for attainment of production goals

<sup>68</sup>Cox and Montelaro, Interview, August 29, 1955.

<sup>69</sup>Cox and Montelaro, Interview, August 13, 1955.

(The material below was taken in part from the indicated source. According to the authority as cited, these recommendations are subject to continuous change.)

#### A. Control of diseases

Late blight is the disease of greatest consequence which affects Irish potatoes. It may be controlled by spraying with Dithane D-14, Dithane Z-78, parzate, or by using copper fungicides such as Bordeaux, copper A compound and others. Some growers dust with a copper dust or Dithane Z-78.

Begin spraying Irish potatoes when they are four to six inches tall and continue at weekly intervals until the danger period of cool moist weather has passed, or until the potatoes are ready for harvest.<sup>70</sup>

#### B. Fertilizer

Apply 600-800 pounds of 6-8-8 or 8-8-8, plus 32 pounds of nitrogen as a top dressing.<sup>71</sup>

For the fall crop on light soils you might use a 6-8-8 fertilizer at the rate of 600 to 1000 pounds per acre. If your fall potatoes follow a crop that was heavily fertilized, you will not need to apply as much fertilizer.<sup>72</sup>

#### C. Use of the proper variety

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<sup>70</sup>John A. Cox, Horticulturist, "Late Blight Control," Mimeographed Material, Division of Agricultural Extension, Louisiana State University, Baton Rouge, Louisiana, 1954.

<sup>71</sup>A Handbook for Extension Workers, Division of Agricultural Extension, Louisiana State University, Baton Rouge, Louisiana, November, 1954, p. 44.

<sup>72</sup>John A. Cox, Horticulturist, "Fall Crop Irish Potatoes Should Be Profitable This Year," Mimeographed Material. Division of Agricultural Extension, Louisiana State University, Baton Rouge, Louisiana, June, 1954.

The LaSoda, a potato developed at the LSU Horticultural Experiment Station, and the Bliss Triumph are the two varieties most widely grown by our farmers who grow potatoes for commercial purposes. The LaSoda has out yielded the Triumph by 50 per cent for the past several seasons. It is a good keeper and higher in solids than the Triumph.<sup>73</sup>

#### D. Proper spacing

Variety	Number of Plants per Hill	Distance
1. LaSoda	1	8" - 12"
2. All others	1	12" - 14"

#### E. Irrigation

For information concerning irrigation, consult your County Agent.

### Pecans

#### I. Introduction

##### A. Economic importance

Pecan growing is an industry that fits in well with general farming. In recent years the pecan has become one of the money crops of the South. If a farmer lives outside of what is known as the commercial pecan belt, he had better confine his efforts at pecan growing to a few acres near the house as a side line; but if he lives in the great commercial pecan region, he may well consider planting part of his land to pecans as a money crop.

Pecan growing has attained its greatest

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<sup>73</sup>A. C. Moreau, Associate Horticulturist, "Order Irish Potato Seed Early," Mimeographed Material. Division of Agricultural Extension, Louisiana State University, Baton Rouge, Louisiana, October, 1954.



development in the Gulf Coast and South Atlantic States.<sup>74</sup>

#### B. Areas of production

The well-drained soils of the Ouachita, Red and Mississippi river valleys are generally well adapted to pecan growing because of their natural fertility, depth and favorable soil-water relationships. The deep, residual upland soils are moderately well suited to pecan production but the yield of nuts from these soils is only moderate compared with that of the good alluvial soils. Some of the deeper loessial soils of the state are also well adapted to pecan production.

The climate of Louisiana is generally favorable for pecan tree growth. Due to a lower average annual rainfall, the climate of the northwestern part of the state is more favorable for nut production than is that of the remainder of the state. Pecan diseases are more numerous in areas of higher rainfall and are more difficult to control. This is especially true of pecan scab, a fungus that attacks both the foliage and the nuts.<sup>75</sup>

The variation in production is not uniform enough to justify the division of the State of Louisiana into production areas.

#### II. Efficiency standards and production goals

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<sup>74</sup>H. P. Stuckey, Southern Horticulture (Atlanta, Georgia: Turner E. Smith and Company, 1951), pp. 92-93.

<sup>75</sup>John A. Cox, and others, "Pecan Production in Louisiana," Agricultural Extension Publication 1057, Louisiana State University, Baton Rouge, Louisiana, 1947, p. 3.

Table IX.--Production Goals for the Pecan Enterprise.<sup>76</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Production per tree (lbs., 15 years or older)	50	300
2. Trees per acre (15 years or older)	12	6
3. Disease and insect control (Degree to which Experiment Station recommendations are followed expressed in per cent)	35	75
4. Fertilizer (Same as above)	50	90
5. Crop rotation system (Same as above)	50	90
6. Varieties	*	90

The figures in this table are studied estimates by the authority cited.

\*Due to the ages of plantings, an estimate is impractical.

### III. Approved practices recommended for attainment of production goals<sup>77</sup>

(The information given below is taken in part from the source cited.)

#### A. Spacing

The spacing of pecan trees depends on the objective of the grower. The yield of nuts per acre of uncrowded trees is about proportional

<sup>76</sup>John E. Cox, Horticulturist, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, September 8, 1955.

<sup>77</sup>Cox and others, op. cit., pp. 3-20.

to the number of trees per acre. Thus, if the objective is to get the maximum production in the early years of the orchard, space the trees as close together as is practical; and provide for thinning the stand when it becomes necessary.

Pecan trees growing on good alluvial bottom land generally need to be spaced 80-100 feet apart on the square at the time they are 40 to 50 years old. On hill land these distances are a little less. The minimum distance at which trees should be set apart is about 50 feet. At this distance you will have to thin the stand after 15 to 20 years.

If the minimum distance of about 50 feet is used in setting an orchard, it is advisable to select trees of an early, heavy-bearing variety for use as temporary trees; that is, the trees that are to be removed in the first thinning. Set these trees in alternate, diagonal rows. They will constitute one-half of the total number of trees planted. At thinning time remove these temporary trees. The remaining trees are uniformly spaced on squares.

In a later statement (1955) by the author of the above reference, he recommends spacing of trees 50' apart on 200' rows. This will provide for the most economical land use while the trees are growing to production size, facilitate disease and insect control, and provide relatively high yields. He bases this opinion on his observations.

#### B. Disease and insect control

Most of the diseases are caused by fungi that infect the foliage. Among these are vein spot, liver spot, downy spot and brown leaf spots. Pecan scab is also caused by a fungus that infects the young foliage, the young shoots and the shucks of the nuts. The more important insects that infest the nuts are the pecan nut case-bearer, the pecan weevil and the hickory shuckworm. Those insects that affect the foliage are the black pecan aphid, the black-margined or honeydew aphid and several species of mites.

Covering the old leaves and shucks by plowing before new growth starts in the spring is important in helping to control foliage diseases, if the coverage is thorough. The most effective sanitation is accomplished where the old leaves and shucks are raked away from the tree trunks before plowing with mold-board plows that are equipped with rolling colters. The plowing should be four to five inches deep. Good sanitation is difficult to attain in heavy soils, because the leaves and shucks are hard to plow under.

While most foliage diseases may generally be fairly well controlled by thorough orchard sanitation, the control of pecan scab requires spray applications of a fungicide in addition to sanitation. Apply the first spray in early spring when buds start opening and the leaves are about half-grown. A solution of 4-1-100 Bordeaux mixture (4 lbs. copper sulphate and 1 lb. hydrated lime in 100 gallons of water) is used for these two pre-pollination applications. Bordeaux mixture spray should not be applied when the temperature is below 55° F., since it may cause damage to the leaves. Apply the third spray at about the time the tips of the small nuts have turned brown, using 6-2-100 Bordeaux mixture (6 lbs. copper sulphate and 2 lbs. hydrate lime in 100 gallons of water). Apply the fourth and fifth sprays at three-week intervals, using 6-2-100 Bordeaux mixture.

The above schedule is designed for use where the infection by scab is severe and hard to control. It may be modified for use under conditions of dry weather or low degrees of infection. For northwest Louisiana, the first of the pre-pollination spray applications may be extended. A rainy period following dry weather usually results in new infections of the nuts, unless they are protected by spray cover.

In many cases insecticides and fungicides may be combined in spray solutions for control of insects and diseases. For instance, a solution made of one pound of 25 per cent wettable parathion powder and four pounds of wettable sulfur in 100 gallons of 6-2-100 Bordeaux mixture may be used for control of

the first generation of the pecan nut case-bearer, mites and aphids and will help to control liver spot, vein spot, brown leaf spot and downy spot. The spray application is timed for control of the nut casebearer and will fall between May 10 and 26. Insecticides also may be combined with Bordeaux mixture used in controlling pecan scab when it is necessary for simultaneous control of insects.

In recent years mites have become major pests in pecan orchards of the state. They rank at present with the black pecan aphid in their damage to pecan foliage and premature defoliation of the trees. As with the aphid, applications of Bordeaux mixture usually, but not always, cause an increase in the mite population. A solution of one pound of 25 per cent wettable parathion powder to 100 gallons of water applied as a spray will control the black pecan aphid and the most harmful species of mites. If it is necessary, add four pounds of wettable sulfur per 100 gallons of the above spray to control the other mites.

Pecan rosette is a nutritional disorder apparently caused by either the lack of or the unavailability of zinc. The symptoms first show a slight, yellowish mottling of the leaves. As the season advances the leaflets become narrowed and crinkled. In severe cases new shoot growth is checked, the internodes are shortened and the leaves and branches die back.

Rosette may be controlled by use of zinc sulphate as a spray, by injecting it into the tree trunks or applying it to the soil. Spraying gives more immediate results than either of the other methods and costs less.

### C. Cover crops

Organic matter is an important factor in building up or maintaining the fertility, moisture-holding capacity and physical condition of soils. Legume crops assimilate nitrogen taken from the air and release it in the soil in decaying. Thus, green manure crops of legumes add nitrogen as well as organic matter to the soil. Non-legume cover crops furnish organic matter to the soil and may be

used where legumes cannot be grown or where the growing of legumes would increase the soil nitrogen beyond the optimum level.

Winter legumes suitable for winter cover crops in pecan orchards include vetch, Singletary peas, Austrian winter peas and *Melilotus indica*. Satisfactory non-legume winter cover crops are rye, oats, wheat and barley.

Winter cover crop seeds, both legume and non-legume, should be planted from September 15 to October 31 for best results. If there is a crop of nuts in the orchard, the seeding should be delayed until the latter part of October so that the cover crop will not interfere with harvesting.

On soils where it may be difficult to turn under a cover crop in the spring before the leaves come out, a spring crop of hardy soybeans may be grown. The seed can be planted in mid-March and the crop turned under in early June.

Summer legumes that grow during June, July and August should not be used in pecan orchards.

#### D. Fertilizer

Hill land - 400 pounds 0-14-0 per acre for one or two years plus good growth of winter legume cover crops. Lesser amounts may be added as needed in subsequent years. Sandy alluvial soils may need an occasional application of 200 pounds of 20 per cent superphosphate to the acre to take care of the winter legume cover crops. The fertilizers should be broadcast shortly before seeding time and disked into the soil.

For hill land orchards where no legume cover crops are grown, the soils generally need a complete fertilizer of the formula 6-10-7 or 5-10-5. The rate of application for either fertilizer mixture is two pounds for each year of age of the trees. For example, a tree that is ten years of age would receive 20 pounds of the fertilizer. The fertilizer should be applied in early spring before tree growth starts and should be plowed or disked

into the soil.

For pecan trees growing in alluvial soils, only nitrogen fertilizers are necessary. If no winter legume cover crops are grown in such orchards, the usual rate of application of nitrogen fertilizers is as follows: about  $3/4$  pound of ammonium sulphate or its equivalent of cyanimide, nitrate of soda or ammonium nitrate for each year of age of the tree. Thus, the application for a 40-year-old tree would be 29 pounds of ammonium sulphate or 28 and one-half pounds of cyanamide or 37 and one-half pounds of nitrate of soda or 18  $2/10$  pounds of ammonium nitrate, the amount being proportional to the percentage of nitrogen in the fertilizer used. The fertilizer should be applied in early spring before tree growth starts. If winter legume cover crops are grown on the alluvial soils, they generally supply sufficient nitrogen for the trees.

Fertilizers for young pecan trees usually are spread over the circular area of soil extending from the tree trunk a little past the branch spread. For older trees the fertilizer is broadcast over the entire area of the orchard, since roots of the older, larger trees occupy all the soil areas.

#### E. Variety

The selection of suitable varieties often means the difference between financial success and failure of a pecan orchard. Climatic and other factors vary widely in different areas of the state. This makes general recommendations for varieties impractical and unreliable. A prospective planter should determine before planting time, if possible, the behavior of varieties in several orchards near his proposed planting site and should also obtain information on the adaptability of varieties to his location from leading pecan authorities.

The characteristics most desirable in a commercial pecan variety are disease resistance and good production of high quality nuts. The nuts should be large in size and attractive, if they are produced for the in-shell market. The filling, or kernel development, of the nuts of different varieties that are equally

well adapted for tree growth in a given locality may vary widely. Those varieties which produce nuts that generally are poorly filled should be rejected. Poor filling means poor quality of kernel and consequently a poor market grade of nut.

The more important varieties grown in the state are the Bradley, Desirable, Elliott, Jennings, Mahan, Moore, Schley, Stuart, Success.

#### F. Topworking

Young native trees in pastures should be topworked with desirable varieties.

### Snapbeans

#### I. Introduction

##### A. Economic importance

There is no record of the culture of beans prior to the voyages of Columbus. Evidence found in the ancient new world tombs has revealed many types and indications of long established culture.

Snap beans rank ninth in acreage among the vegetables but seventh in value of product. The crop averaged \$25,000,000 in value in 1940 and 1941, a marked gain over the 10-year average of \$17,000,000. Beans for fresh market involve three-fourths of the total acreage.

Florida plants over a third of the acreage of beans for fresh market. North Carolina and California follow. Seven states reported an average of more than 10,000 acres for 1940 and 1941. The principal states producing for processing are Maryland, Wisconsin, New York, and Michigan.<sup>78</sup>

Snap beans in Louisiana are valued at more than \$1,000,000 annually. In 1950, 512 carloads

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<sup>78</sup>Paul Work, Vegetable Production and Marketing (New York, John Wiley and Sons, 1945), p. 410.



were shipped from 6,200 acres planted for fresh market.

#### B. Areas of production

Beans are grown commercially in Ascension, Livingston, Orleans, St. Helena, Tangipahoa, Terrebonne, Washington, Lafourche, West Feliciana and below New Orleans in Plaquemines and St. Bernard Parishes. Although this represents the main commercial-producing areas, beans are grown also throughout the state for canning, market gardens, and home use.<sup>79</sup>

### II. Efficiency standards and production goals

Table X.--Production Goals for the Snapbean Enterprise.<sup>80</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Production per acre (bu.)	140	240
2. Variety (Degree to which Experiment Station recommendations are followed expressed in per cent)	65	85
3. Soil preparation and fertilization (same as above)	65	85
4. Per cent of total crop in pole beans	10	25

The figures in this table are studied estimates by the authority cited.

<sup>79</sup>John A. Cox, and Joseph Montelaro, "Grow Snap Beans," Agricultural Extension Publication 1128, Louisiana State University, Baton Rouge, Louisiana, October, 1952, p. 3.

<sup>80</sup>Cox, Interview, September 8, 1955.

III. Approved practices recommended for attainment of production goals<sup>81</sup>

(The material given below is quoted in part from the source cited.)

A. Use of proper variety

Bush bean varieties which do best in Louisiana are the Davis Stringless Wax, Sure Crop Wax, in the wax group, and the following green pod varieties: Bountiful, Stringless Black Valentine, Giant Stringless Greenpod, Contender and Wade. Stringless Black Valentine and Contender are recommended for the early and main shipping season when a volume of beans is being moved. The Bountiful, a flat-type bean, is recommended only for early market. The Giant Stringless Greenpod is usually planted for canning and home use.

Pole bean varieties which do best in Louisiana are the McCaslan, Canfreezer, Blue Lake, Kentucky Wonder, Ideal Market and Green Savage.

B. Proper soil preparation and fertilization

No special preparation of the land is necessary, other than to have it in good condition at planting time. If a cover crop is grown, it should be plowed under at least a month before the beans are planted.

From 200 to 400 pounds of 4-12-4 or 5-10-5 per acre on a 3 and one-half foot row is the generally recommended basis for fertilizing. On light, sandy soils, 800 pounds is recommended for beans in the spring and 400 pounds in the fall. Drill fertilizer into the row before planting or place it in bands at the sides of seed when planting. Fall beans planted on good soil following a spring crop of soybeans or cowpeas that have been turned under in early summer or following a crop that has been heavily fertilized need no fertilizer.

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<sup>81</sup>Cox and Montelaro, op. cit., pp. 3-7.

Bean seed are very subject to fertilizer burning. To prevent fertilizer damages the fertilizer should be placed in drills two inches from each side of the seed, if planting is done at the time the fertilizer is applied. If the fertilizer is applied beneath the seed, it should be put down at least two weeks before planting. The use of bean planters for drilling fertilizer in bands on each side of the seed is preferable.

#### C. Pole and bush bean ratio

Cox states that the bean crop should be composed of 75 per cent bush varieties and 25 per cent pole varieties.

#### D. Date of planting

Spring planting season is late February and early March. Fall planting is done from August 10 to September 15. In the spring, earliness is an important factor, because early beans that escape injury from cold mature when the price is usually the best. Besides, early spring beans generally make heavier yields. Normally bush beans are planted first for early market. If you plant your fall beans too early, however, they are likely to be severely injured by hot weather and insects and will mature too early for the northern market.

#### E. Irrigation (particularly the fall crop)

For information concerning this practice consult your Louisiana Experiment Station.

### Cabbage

#### I. Introduction

##### A. Economic importance

Wild cabbage, edible and hardy, grows on the chalky Dover cliffs of England and in many other European coastal regions as well. There is also a wild form on the coasts of the Spanish peninsula. From these have been developed our many diverse forms of Brassica crops, from

rutabaga to cauliflower. The Greeks knew and prized some cabbage like plant which legend said sprung from the sweat of Jupiter when he strove to reconcile two conflicting oracles. Cabbage has been an important vegetable in many countries from ancient times. The Chinese are more familiar with the Chinese cabbage and the mustards than with our forms. It is possible that the hard-heading forms trace from Northern Europe and from times since Charlemagne.

Cabbage ranks eighth among the vegetables in the United States, in acreage and value of product, and fourth in tonnage. It is a cheap food much used by laboring people, especially those of European parentage. Normally about 150,000 acres are grown for market, of which 36,000 acres are northern late Danish. Kraut making calls for about 20,000 acres. New York is the leading state, with 32,000 acres; Texas follows with 27,000 acres, for winter and spring market; and Wisconsin plants about 16,000 acres; Cabbage in the United States is normally about a \$15,000,000 crop.<sup>82</sup>

Growing cabbage in Louisiana is important, especially in the fall and early spring. Although it is one of the leafy vegetables, it finds a place in the home garden as well as in the market garden and truck farm. It is a cool weather crop and will stand considerable cold.

High yields of quality cabbage depend on the use of suitable varieties, on well-prepared rich soil, proper cultivation, and the control of insects and diseases.<sup>83</sup>

#### B. Areas of production

Cox states that a division of the state

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<sup>82</sup>Work, op. cit., pp. 475-476.

<sup>83</sup>John A. Cox and others, "Growing Cabbage in Louisiana," Agricultural Extension Publication 1043, Louisiana State University, Baton Rouge, Louisiana, 1950, p. 3.

into production areas would not be practical in the case of cabbage.<sup>84</sup>

## II. Efficiency standards and production goals

Table XI.--Production Goals for the Cabbage Enterprise.<sup>85</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Production per acre (tons)	8	12
2. Variety (Degree to which Experiment Station recommendations are followed expressed in per cent)	85	95
3. Fertilizer (same as above)	85	95
4. Date of planting (same as above)	75	90
5. Disease and insect control (same as above)	65	90

The figures in this table are studied estimates by the authority cited.

## III. Approved practices recommended for attainment of production goals<sup>86</sup>

(The material given below is taken in part from the source cited.)

### A. Variety

Grow varieties which produce medium-sized heads, from 3-5 pounds. Buyers of Louisiana cabbage request this size. It takes less time

<sup>84</sup>Cox, Interview, September 8, 1955.

<sup>85</sup>Cox, Interview, September 8, 1955.

<sup>86</sup>Cox, op. cit., pp. 3-15.

to grow small-headed varieties than it does to produce the large-headed type.

A variety which will produce large yields of market type heads, and which is also disease resistant, is hard to find. The Copenhagen type, including such varieties as Copenhagen Market, is a market choice. The Golden Acre is a Copenhagen type cabbage. Glory of Enkhuizen and All Head Early are favorites in Louisiana. For fall planting use either the Glory of Enkhuizen, Wisconsin All Season or Louisiana All Year varieties. Charleston Wakefield and All Head Early are grown for midwinter and early spring harvest. These are harvested in February and March and are recommended because they can stand the cold weather.

For the late winter or early spring crop, harvested in March and April, grow the Glory, Copenhagen Market and Marion Market varieties. All Head Early is also grown for early spring harvest.

#### B. Fertilizer

On a 3 and one-half foot row basis, apply 600 to 800 pounds of 4-12-4 mixture per acre, in a drill beneath the ridge, when the land is prepared 10 days to two weeks before planting. Apply two top dressings of nitrate of soda at the rate of 100 pounds per acre for each application during the growing period. Apply one when the largest leaves are 2 and one-half to 3 inches wide, and another when leaves are about 5 inches wide.

#### C. Date of planting

In July, August and September you can plant seed in fields on the row. Seed can also be planted in beds for transplanting later where facilities are available and conditions favorable for the same. From July to November, plant on open bed and transplant to field later. From October to December you can also plant in cold frames for transplanting. From September to December a combination of planting methods is used for the main crop.

#### D. Disease and insect control

## Diseases

Principal diseases affecting cabbage in Louisiana are Black Rot, Downy Mildew or "Rust" and Damping Off.

You should treat your cabbage seed as follows:

For "Black Rot" control, place them in a cloth bag and soak in a 1-1---solution of bichloride of mercury for 20 minutes. Wash the seed in several changings of water and spread them out to dry. You can buy this chemical (bichloride of mercury) at the drug store and directions for making the 1-1---solution are on the package. Use a glass jar, crock, or wooden container as this chemical corrodes metal. It is not harmful to your hands, but is poisonous to livestock if they drink it.

For "Damping Off" control, place the seed in a fruit jar or similar container with either Semesan, Arasan, Zinc Oxide, or Vasco 4. Shake until all seeds are well coated with the dust. About 2 level teaspoonfuls of dust, per pound of seed, will be enough. Plant immediately or store in a dry place.

Just as the young seedlings begin to come up, dust the top of the ground over the plants with either Semesan, Arasan, Zinc Oxide or Vasco 4. Use enough to form a coat around the young plants when they are up. This kills the damping off organism on the surface of the soil. For cabbage plants in a small plant bed, use this dust at the rate of 2 ounces (about 8 teaspoonfuls) per 3 square feet of soil.

For "Rust" (downy mildew) control, spray with spergon (wetable). Begin spraying when the plants are up to a stand. Spray the seedbed twice each week. You should apply the spray before "Rust" appears in order to control it. No expensive spray equipment is necessary. Use a small hand spray. Use wettable spergon at the rate of 3.2 ounces per 5 gallons of water, with 4 ounces of orvus, (spreader) or equal.

By planting seed in late September or early October, you get larger plants. These plants will withstand the attack of "Rust" better.

However, if planted too early, plants will be too large, or "overgrown." These plants often "bolt," or develop into "Seeders." By using proper control measure, cabbage seed can be planted in late October or early November.

#### Insect control

Several species of caterpillars, or "worms," feed almost exclusively on cabbage and related crops. The more important kinds are the cabbage looper, the imported cabbage worm, the diamondback moth, the cabbage webworm, and the cross-striped cabbage worm. Besides these, several species of general feeders, including cut-worms, the corn earworm, the fall armyworm and the garden web-worm, often cause damage to these crops.

#### Fall crop

Before heads are formed, dust with 3% or 5% DDT. The first application should begin as soon as the plants are up to a good stand and before the first pair of true leaves form. Later applications should follow at 10 to 14-day intervals until the heads or edible portions begin to form. The rate of application should be from 10 to 15 pounds of the dust, per acre, per application. The exact amount to apply depends on the size of the plants and the width of the rows. It is important to have the plants as free of insects as possible at the time of the last dust application. It is suggested that the final DDT dusting be applied at a heavier rate in order to secure a deposit of poison which will remain effective well over into the heading period. Malathion, a relatively new chemical, has also been used with very excellent results on the control of cabbage worms and other insects.

After heads are formed, you might not have to use insecticides if you followed the pre-heading dusting schedule outlined above. However, should the caterpillars cause damage at this time, they can be controlled with a rotenone dust. Pyrethrum dust gives a somewhat superior control on the fall crops, but is not available in most cases. If you use pyrethrum flowers powder, dilute it with two parts by weight of a carrier such as talc, phrophyllite,



sulphur or flour. The impregnated pyrethrum dusts should contain a minimum of 0.2 per cent of total pyrethrins. If pyrethrum dust is not available, rotenone dust, 1 per cent strength, may be substituted.

Since neither pyrethrum dust nor rotenone dust is 100 per cent effective against all species of caterpillars that may attack the heads, these two insecticides may be combined in order to secure a 100 per cent protection. To prepare the combination, use equal parts of a 1 per cent rotenone dust and a ready-to-apply pyrethrum dust. When applying these non-poisonous insecticides to the heading crop, two trips per row should be made if a hand duster is used, or one trip per row if a mechanical duster is used. Apply the dusts at the rate of 10 to 20 pounds per acre per application, at 10 to 14-day intervals.

#### Spring crop

Plant Beds - Dust the plants at weekly intervals while they are still in the beds with rotenone-sulphur dust. The rotenone content of the dust should be 1 per cent, the remainder, dusting sulphur. This will control plant lice, worms, beetles, and mildew.

After the plants are set in the field, they should be closely examined at frequent intervals and when the caterpillar population averages one worm per plant, the dusting schedule, using 3% or 5% DDT dust, should begin. Applications should continue at 10 to 14-day intervals until the heads begin to form. If the population of "worms" does not average one per plant by the time heading begins, apply DDT dust to kill those worms present and to aid in holding the caterpillars in check during the heading period.

Insect damage to cabbage and related crops after heading is usually more serious in the spring than in the fall. A 1 per cent rotenone dust is more effective than pyrethrum at this season of year and is therefore recommended. However, a combination of the two as suggested under "fall crop" gives the best results. The rate of application and interval between treatments are the same as given under "fall crop."

## E. Irrigation

Consult your Agricultural Experiment Station for information concerning this approved practice.

## Pasture

### I. Introduction

#### A. Economic importance

Pasture is a crop. It should be considered as such the same as cotton, rice, sugarcane and corn. There are at least four good, economic reasons for developing and maintaining pastures at a high producing level. These are:

1. Pastures provide the major raw materials for the production of livestock products..
2. It is only through pastures that any great increase in feed production is possible.
3. Pasture grasses and legumes will produce on much of the crop lands of Louisiana more total digestible nutrients per acre than will corn or other feed grains, at lower costs and with much greater returns per man-hour of labor.
4. Improved pastures are required in crop rotation for sustained maximum production of other crops in that rotation. One exception might be where legumes are turned under regularly on alluvial land.

It has always been more profitable to get as much livestock feed from pastures as possible. The North Carolina Experiment Station found that it cost only 58 cents to produce 100 pounds of total digestible nutrients from pasture as compared to \$1.35 from alfalfa hay, \$1.77 from corn and \$2.07 from oats.<sup>87</sup>

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<sup>87</sup>R. A. Wasson, and W. E. Monroe, "Louisiana Pastures," Agricultural Extension Publication 1037, Louisiana State University, Baton Rouge, Louisiana, October, 1952, p. 3.

## B. Areas of production

According to Monroe,<sup>88</sup> the state of Louisiana should be divided in the following areas of production:

Area I--Alluvial soils.

Area II-Upland soils.

## II. Efficiency standards and production goals

Table XII.--Production Goals for the Pasture Enterprise.<sup>89</sup>

Efficiency Factors	<u>Efficiency Standards</u>		<u>Production Goals</u>	
	<u>Land Area</u>		<u>Land Area</u>	
	I	II	I	II
1. Animal units per acre - cattle	.7	.5	1.2	1.0

The figures in this table are studied estimates of the authority cited.

## III. Approved practices recommended for attainment of production goals<sup>90</sup>

(The material given below is taken only in part from the source indicated.)

<sup>88</sup>W. E. Monroe, Associate Extension Agronomist, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, September 16, 1955.

<sup>89</sup>Monroe, Interview, September 16, 1955.

<sup>90</sup>Wasson and Monroe, op. cit., pp. 8-17.

### A. Grazing

If the ground is sufficiently firm when seed are planted, the plants are not likely to be pulled up by grazing. As a general rule, grazing can start safely when the clover and grass sod are well set and about four inches high.

Steady overgrazing is very injurious to pasture stands and should never be done. Grazed plants must have a chance to recover so they can grow and keep a strong, vigorous root system to get the nourishment they need from the soil.

### B. Weed control

When bitterweeds or any other weeds except dock become abundant in pastures, that is a sure sign that these pastures are either badly overgrazed or do not have enough necessary plant foods. Where nitrogen, phosphorous, potash and calcium are sufficient and the pastures are not overgrazed, such plants as clover, Dallis and Bermuda grasses get a vigorous early start and shade out the bitterweeds and other weeds. This is not necessarily true on carpet grass pastures, since carpet grass does not respond sufficiently to fertilization to do the job. Probably the most effective means of control after the bitterweeds come into the pastures is as follows:

As soon as the first bitterweed blooms appear, clip the pasture with a mower. Raise the cutter-bar of the mower to cut just under the blooms. When the second crop of blooms appears, mow again, this time cutting the weeds as close to the ground as possible. In the fall, renovate the pasture and fertilize liberally. If clover is present, use 600 pounds per acre of a 3-12-12 or 4-12-8 or its equivalent. If no clover is grown, use the same rate of a 6-8-8 or 8-8-8. If this doesn't do the job, top-dress with 30 pounds of additional nitrogen in the spring when the betterweeds first appear. It may take two years to completely stamp out the bitterweeds but it can be done. The formula is more fertilization and proper mowing.

To control dock apply 2,4-D at the rate of  $3/4$  to one pound acid equivalent of the amine salt per acre. Apply as a spray in solution with 60 gallons of water. One quart of the 2,4-D is one pound and this is mixed with 60 gallons of water to go over one acre. E. R. Stamper, of the L. S. U. Experiment Station, says this rate of 2,4-D will not injure White clover, Dallis and Bermuda grasses.

The most effective time of application is between September 15 and April 15. Apply when weather is mild ( $65^{\circ}$  F. and above). It is most effective on dock when it is making early, fast growth. If applied under these conditions, 80 to 90 per cent control of seedlings and annual dock plants should be gotten. However, the dock may come back again from old root-stocks. If it does, repeat the treatment the following season. Treatments after March 1st will curtail seed development but will not control the tough, fibrous plants. Do not spray when rain threatens. When plants dry after a 2,4-D application, rain will not decrease its effectiveness. Cold weather retards action. It is not necessary to remove cattle while spraying and no harm has resulted when cattle eat the sprayed plants.

This information on weed control comes from a progress report of the Southern Regional Research Committee, which is working on this problem and is furnished by E. R. Stamper, Assistant Plant Pathologist, L. S. U. Mr. Stamper is in charge of chemical weed control work for the Louisiana Experiment Station.

According to field notes of T. C. Ryker, formerly with the Louisiana Experiment Station, 98 per cent control of all pasture weeds in the rice area was gotten with the application of one pound per acre of the amine salt of 2,4-D applied June 19 as a spray. There was no injury to the pasture grasses. Use the amount of water necessary to cover the area.

#### C. Fertilizer

In general, no fertilizer or lime is needed for establishing good pastures on river bottom soils. On all other soils the first

application should be 500 to 800 pounds per acre of 5-10-10, 4-12-8 or 3-12-12. Additional nitrogen should be used as a top-dressing, as needed. The liberal and timely use of fertilizers will do more to insure abundant grazing than all other practices put together. Each ton of needed fertilizer will return about 8,000 pounds of milk or 1,000 pounds of beef. Don't spread the fertilizer too thin, for it will require too much land and labor to do the job.

To properly maintain a clover-grass sod on all except river bottom lands will require about 500 pounds per acre of 3-12-12 or 5-10-10 each year. Even at this rate additional nitrogen may be required after clovers mature to keep the grass green and growing.

In general, lime should be used on all pastures for clover, if the soil pH is below 6.0. These soils usually require from 1,000 to 3,000 pounds per acre of ground limestone or sea shells but more lime than this will be needed on acid prairie soils. However, lime is not needed on all prairie soils.

Apply the lime by spreading it evenly over the surface. Mix it thoroughly with the top four inches of soil. Apply fertilizer several days after liming and several days before seeding. Mix the fertilizer well with the soil. Where phosphate is used alone, apply nitrogen and potash later as a topdressing after the plants are up to a stand.

The needs of pasture soils for fertilizers and lime can seldom be estimated accurately enough to insure maximum growth. To be safe and sure a laboratory analysis should be made from carefully selected samples of the soil. The analysis report should be studied and the amount of fertilizers and lime recommended should be applied. As a general guide, any soil testing below 25 parts per million (PPM) available phosphorous, 80 PPM available potassium, 500 PPM available calcium or having a soil pH below 5.6 is deficient in these elements.

## Breeding Beef Cattle

### I. Introduction

#### A. Economic importance

The greatest expansion of beef production during the past decade has taken place in the South.

The 10 top states in percentage gains in cattle population for a recent period were, in order of rank, as follows: Alabama, Georgia, North Carolina, Florida, Louisiana, Arkansas, Mississippi, South Carolina, Tennessee, and Oklahoma. Texas, which is not included in the list of 10 top states in terms of percentage gains, has on its farms and ranches the largest number of cattle found in any state in the nation.

So great are the cattle population gains in the South that Florida, for example, increased the number of beef cattle on farms and ranches more than 100 per cent within a 10-year period.

The reason for the very rapid expansion of the cattle industry in the South is found in the increasing acres devoted to pastures and grazing crops.

Since the soil conservation program was started in the United States, the South has seeded more acres to improved pastures, and has improved more acres of rangeland, than all other sections of the nation combined.

This trend will continue. The South has 40 million additional acres that may be cleared and put into grazing crops. This is more potential, additional pasture land than is available in the other three regions of the United States.

The development of animal enterprises, mainly cattle, can go forward for years in the South without reducing the income from crops. In fact, expansion of animal enterprises will increase crop returns for the reason that the productivity of the land will be increased because of the wise land management incident

to grassland and cattle farming.

On the basis of available acres, livestock can be increased four times in the South without the use of any acres now devoted to row crops.

In growing grass and forage crops, the South has the distinct advantage of having a longer grazing season than any other section of the nation. It is possible, on an average, to provide 10 months of grazing each year.<sup>91</sup>

In 1954, the number of cattle on the farms of Louisiana, excluding dairy cattle, reached an all-time high of 1,476,000 head.<sup>92</sup>

#### B. Areas of production

According to Parham,<sup>93</sup> the variation in production of beef animals in Louisiana is not localized enough to justify the division of the state into distinct production areas.

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<sup>91</sup>Paul W. Chapman and Wayne Dinsmore, Livestock Farming (Atlanta, Georgia: Turner E. Smith and Co., 1953), pp. 174-175.

<sup>92</sup>Montgomery, op. cit., p. 21.

<sup>93</sup>A. P. Parham, Associate Animal Husbandman, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, September 20, 1955.



## II. Efficiency standards and production goals

Table XIII.--Production Goals for the Breeding Beef Cattle Enterprise.<sup>94</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Weight of breeding cows at 4 years	800	1,000
2. Live calves per cow per year	.75	.95
3. Weight at weaning (7 months)	350	500
4. Per cent of calves grading the following at weaning:		
Choice	.05	.60
Good	.15	.40
Commercial	.50	0
Utility	.30	0
5. Per cent of brood cows grading the following:		
Good	.10	.60
Commercial	.30	.40
Utility	.40	0
Below commercial	.20	0

The figures in this table are studied estimates by the authority cited.

## III. Approved practices recommended for attainment of production goals<sup>95</sup>

<sup>94</sup>Parham, Interview, September 20, 1955.

<sup>95</sup>W. T. Cobb, "Louisiana Beef Cattle," Agricultural Extension Publication 1058, Louisiana State University, Baton Rouge, Louisiana, August 1950, pp. 6-19.

(The material given below is taken only in part from the indicated source.)

A. Provide an adequate feed supply.

1. Improved pasture.
2. Good winter feeding program. (concentrate, silage or hay.)

B. Use purebred sires.

C. Save good replacement heifers and properly grow them out before breeding.

D. Control external and internal parasites.

Scab lice, mange and flies do a world of damage to cattle in Louisiana. Also, grubs are a problem. The new materials available now make it inexcusable for any cattleman to allow his cattle to harbor lice or scab. BHC and DDT are relatively cheap materials that are highly effective. Rotenone is the best material to control grubs. It may be applied either by spraying with a power sprayer or by dipping.

The most common internal parasites in Louisiana which affect cattle are the hookworm, stomach worm, liver fluke and lungworm.

Hookworms and stomach worms become most evident among cattle when they are at a low level of thrift. Where cattle are well fed on nutritious feeds containing all the elements needed, including minerals and vitamins, little loss is experienced from these two types of internal parasites.

Some serious cases do develop, however, in which case treatment must be given. Phenothiazine is the material that has proved to be the most effective.

The liver fluke is harder to deal with and requires sanitation as well as treatment. One part of the life cycle of this pest is spent in a little conical snail found around watering places and on the edges of ponds and bayous. Treat area, when small enough, with copper sulfate at the rate of one part to a

million parts of water. Treatment consists of giving Hexachlorethane.

No known treatment is effective against lungworms. Pasture rotation and plowing up of old pastures offers the best solution.

#### E. Creep feed calves

Creep-fed calves will add from 40 to 80 pounds more weight than those not so fed. They will make this gain more cheaply than at any other time. Creep-fed calves can be sold at weaning time, carrying more weight than non-creep-fed calves, with no reduction in price per pound.

#### F. Practice good management

1. Calves should be castrated and dehorned at an early age.
  2. Calves should be vaccinated for blackleg.
  3. Control brucellosis and anthrax in the herd.
- G. After a good herd of beef cattle is established, performance or progeny testing the herd should be practiced.

### Fattening Beef Cattle

#### I. Introduction

##### A. Economic importance

Beef, the flesh of cattle, has for about the last three centuries comprised the principal product from cattle of the beef type. It is true that beef was used as food long before three centuries ago, but in earlier times it was the by-product rather than the principal product of cattle. Steers were maintained primarily as draft animals, and cows were until they reached advanced age, when they were slaughtered and the flesh used as food. The present day beef is a long step from the tough, leatherlike beef of the worn-out work ox of three centuries ago to the savory, rich, tender beef roasts and steaks of today.

The annual per capita consumption of beef varies widely in different countries.

Consumption is influenced by availability, cost, and competition from other food products, notably other meats. In the United States, the efficiency and aggressiveness of the meat-processing industry in the development of wholesale meat distribution and the existence of retail meat markets in nearly every town and village, no matter how few the inhabitants, makes beef readily available to practically every citizen of the country. The cost of beef to the consumer, however, is sometimes high, especially when compared to substitutes and, at times, when compared to other meats, notably pork. In this country, cost is more often the factor limiting consumption rather than availability, since the capacity of the country to produce beef is equal to the highest consuming capacity that might be developed. During the last hundred years, consumption of beef in the United States has varied from a minimum of about 45 lb. to a maximum of about 70 lb. per person per year. In 1950 per capita consumption was 63 lb. About 18,000,000 cattle were slaughtered to produce this beef.<sup>96</sup>

There are no figures available on the number of beef cattle fattened and sold in Louisiana. This practice is becoming more common in the south. It is predicted by most authorities that this enterprise will continue to grow in this state in importance.

#### B. Areas of production

It is not practical to divide the State of Louisiana into production areas for fattening cattle.<sup>97</sup>

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<sup>96</sup>Walter H. Peters and Robert H. Grummer, Livestock Production, Second Edition (New York: McGraw-Hill Book Company, 1954), pp. 75-76.

<sup>97</sup>Parham, Interview, September 20, 1955.

## II. Efficiency standards and production goals

Table XIV.--Production Goals for the Fattening Beef Cattle Enterprise.<sup>98</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Pounds gained per day per animal	1.5	2.5
2. Per cent of gain contributed by pasture	.80	.60
3. Per cent of gain contributed by feedlot	.20	.40
4. Average weight per steer when purchased	400	500
5. Average weight per steer when sold (lbs.)	700	1,000

The figures in this table are studied estimates by the authority cited.

## III. Approved practices recommended for attainment of production goals<sup>99</sup>

(The material below is taken only in part from the indicated source.)

### A. Use better grade of cattle

In selecting feeders, consider carefully the relative prices of feeders of various ages, weights, and grades, and their quality, uniformity, and condition.

<sup>98</sup>Parham, Interview, September, 1955.

<sup>99</sup>Parham, Interview, September, 1955.

The higher the grade or quality of the feeder the more economically will it use its feed. The high-grade steer has greater capacity for feed and makes more economical use of it in laying on flesh in the regions of the valuable cuts. The buyer should keep this fact in mind, but should not be influenced to such a degree that he will buy only the highest-priced feeders. The quantity and nature of available feeds and the length of feeding period should largely determine the age of cattle to feed. The younger the animals the longer will be the feeding period. Young cattle put their feed to three distinct uses-- (1) maintenance, (2) growth, and (3) fat. All animals require a certain quantity for maintenance, but the quantity required for growth diminishes gradually with the age of the animal. As growth ceases more of the feed above that required for maintenance goes toward fat formation. Older cattle, therefore, fatten in a much shorter time.

- B. Make feeding operation more efficient.
- C. Feed cattle to heavier weight (1,000 lbs.)
- D. Develop a good grazing and feeding program in combination.
- E. Develop better markets in the state for fat cattle.

### Commercial Milk Production

#### I. Introduction

##### A. Economic importance

Milk is the principal product of dairy cattle. Beef and veal are properly considered by-products. Less than one-half of the total supply of milk is used for direct consumption. Butter, cream, and cheese resulting from simple processing of milk are in practice considered primary products of the dairy cow, as are ice cream and the several condensed-milk products resulting from more complex processing.

Just when man began to use milk as food for himself is not known. Neither is it known when butter and cheese were first made.

Earliest writings indicate that milk was used as whole milk and that butter and cheese have been made for many centuries. Ice cream and the condensed-milk products are of more recent origin.

Skim milk, buttermilk, and whey are by-products of considerable significance resulting from separating cream, from buttermaking, and from cheese making, respectively. Cottage cheese, dried skim milk, dried and semisolid buttermilk, casein, and lactose are additional by-products of growing importance. A number of chemical products of lesser value and limited use, such as albumin and lactic acid, are made from milk or from the by-products resulting from the processing of milk.

. . . . .

The total annual per capita consumption in the United States of all dairy products expressed in terms of milk was 760 lbs. in 1950.

. . . . .

To produce this supply of milk, about 26,000,000 cows are maintained primarily for milk production.<sup>100</sup>

In 1953, the value of combined sales of butter, cream, and milk in the state of Louisiana for the farmer was \$33,983,000, according to Agricultural Statistics for Louisiana.<sup>101</sup> The gross income which included home milk consumption was \$51,968,000.

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<sup>100</sup>Peters and Grummer, op. cit., pp. 145-146.

<sup>101</sup>Montgomery, op. cit., p. 23.

B. Areas of production<sup>102</sup>

Neasham indicated that there was no significant or uniform difference in the production of milk per cow in various sections of the state.

## II. Efficiency standards and production goals

Table XV.--Production Goals for the Commercial Milk Production Enterprise.<sup>103</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Size of herd	30	30
a. In milk	20	25
b. Dry	10	5
2. Annual production per cow		
a. Whole milk (lbs.)	5,000	8,000
b. Fat (%)	4.5	4.5
3. Annual average income per cow over cost of feed based on \$6.00 cwt milk	\$200.00	\$300.00
4. Breeding efficiency (services per cow)	1.7	1.5
5. Grain-milk ratio	1 to 2	1 to 3.5

The figures in this table are studied estimates by the authority cited.

<sup>102</sup>E. W. Neasham, Dairy Specialist, and others, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, August 30, 1955.

<sup>103</sup>Neasham and others, Interview, August 30, 1955.



### III. Approved practices recommended for attainment of production goals<sup>104</sup>

#### 1. DETERMINE SUITABILITY OF FARM AND OTHER RESOURCES FOR DAIRYING:

Consider: Personal liking for the dairy business;  
 Labor requirements - relatively high for a good dairy enterprise;  
 Acreage and quality of land available;  
 Capital needed - relatively large for herd and equipment; and  
 Availability of suitable market.

#### 2. ESTABLISH A BUSINESS OF PROPER SIZE:

Size of the Dairy enterprise directly affects net returns to the operator - should be large enough for efficient use of labor and other resources.

For one man (raising most of food and using extra labor only during harvest peaks)-

Minimum size herd--15 cows (12 milking.

Maximum size herd--30 cows (25 milking.

For two full-time men (raising most of feed).

Maximum size herd--40 to 50 cows.

Allow a minimum of 4 to 6 acres of land, crops and pasture, per cow, where most of feed is raised--assuming 50-bushel corn land.

#### 3. REDUCE LABOR REQUIREMENTS:

Plan work procedure and each task from standpoint of saving time and labor.  
 Arrange equipment, doors, and gates conveniently and make use of labor saving equipment.

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<sup>104</sup>A Handbook for Extension Workers, op. cit., pp. 25-27.

#### 4. CONTROL DISEASES:

Vaccinate heifer calves for Bangs at 6-8 months. Blood test herd at regular intervals.

Test for T. B.

Follow recommendations for control of mastitis.

#### 5. PRACTICE HERD IMPROVEMENT

Improve through better breeding, feeding, and management practices.

Use a registered sire--proved if possible.

Keep accurate breeding and calving records.

Join a D. H. I. A. --keep careful records for each cow's production.

Cull least profitable producers--keep replacements from best producers.

Give cows 6-8 weeks dry period before freshening--especially for high producing cows.

Get high production per cow--just as important for efficiency as high yields per acre.

Grow out replacements to produce large animals at maturity.

Control calf losses by proper feeding, sanitation and housing.

#### 6. DEVELOP PASTURE PRODUCTIVITY TO A MAXIMUM:

Save labor, production costs and soil with a good pasture system. Use renovated permanent pastures and supplementary pastures grown in short rotations.

With limited acreage--provide adequate pasture first; roughage (hay and silage) next; and concentrates last--only after other requirements are met.

#### 7. EMPLOY GOOD FEEDING PRACTICES:

Use high quality legume hay and silage as basis for a good winter feed supply and dry summer periods.

Feed grain according to productivity of the individual cow.

Provide mineral in feed and free-choice.

Feed dry cows adequately.

#### 8. MARKET PRODUCE TO ADVANTAGE:

Produce a quality product, clean milk, handled properly.

Cooperate with other producers to develop market outlets.

Take advantage of higher fall prices and produce a more even milk flow throughout the year by fall freshening.

## Raising The Dairy Calf

### I. Introduction

#### A. Economic importance

Providing replacements for the dairy herd has become of increasing importance during the past few years. With the rapid growth and expansion of the dairy industry in the South it has been necessary in many cases for the dairyman or for those who want to establish a dairy to purchase animals from the Midwest. Many farmers have hesitated to go into the dairy business because animals could not be found within a reasonable distance and at a reasonable price.

Improvement in the inherent producing ability of a dairy herd is accomplished either through purchased replacements or through calves that are raised. In order to maintain a herd, approximately 20 per cent to 30 per cent of the milking herd must be replaced each year. This means that in order to maintain the present population of 326,000 dairy cattle in Louisiana approximately 65,000 to 98,000 dairy heifers must come into production each year. Raising replacements has assumed added significance during the past few years as the of using good dairy sires and the artificial breeding program. Artificial breeding has made it possible for the farmer to breed his cows, at a very reasonable price, to the best bulls that money can buy. The advantages of raising replacements as compared to buying them are as follows: (1) Less expensive. Good cows are expensive and hard to find. (2) Minimizes incidence of disease. Once a herd has been established as a clean herd it is unwise to run the risk of infecting a herd by introducing animals from the outside. (3) Genetical improvement factor. The breeding value of

purchased animals is often unknown. The most certain way to improve the producing ability of a dairy herd is to breed the cows to sires of known optimum size. One may use the best of these heifers as replacements for the lower producing cows that are culled or sold each year. (4) Better acclimated to local conditions. Although the importance of this factor is not fully established, it seems that animals brought in from different regions may not be very efficient as breeders or milk producers until a period of time has elapsed in which they would have an opportunity to become adjusted to local management practices and the environment.

The cost of raising a heifer until she is in production is just as high for one carrying poor inheritance as for one carrying good inheritance. Consequently, it is uneconomical to spend time and money raising a calf that, because of the undesirable characteristics of its parents, is not likely to be a profitable cow. The first consideration in raising good calves for replacements is to select only calves sired by good bulls and out of good cow families. The improvement of dairy herds depends upon raising healthy, well grown calves from parents with the ability to transmit high production and desirable characteristics.<sup>105</sup>

#### B. Areas of production

Neasham<sup>106</sup> states that there are no significant differences in the requirements for production of dairy herd replacements in different areas of the state.

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<sup>105</sup>L. L. Rusoff and J. B. Frye, Jr., "Dairy Calf Research in Louisiana," Louisiana Bulletin No. 494, Agricultural Experiment Station, Baton Rouge, Louisiana, March 1955, pp. 5-6.

<sup>106</sup>Neasham, Interview, August 30, 1955.

## II. Production Goals for a dairy heifer enterprise

Table XVI.--Production Goals for the Dairy Heifer Enterprise.

Age of Heifer months	Production Goals <sup>107</sup>			
	Holstein	Ayrshire	Guernsey	Jersey
	inches	inches	inches	inches
Height at Withers <sup>108</sup>				
1	30.5	27.0	28.5	27.0
2	32.5	28.5	30.0	29.0
4	36.5	32.0	34.0	32.5
6	40.0	35.0	37.0	36.0
8	42.5	37.5	40.0	39.0
10	44.5	40.0	42.0	41.0
12	46.5	42.5	43.5	42.5
14	48.0	44.0	44.5	43.5
16	49.0	45.0	45.5	44.5
18	50.0	46.0	46.5	45.5
20	51.0	46.5	47.0	46.0
22	51.5	47.5	47.5	46.5
24	52.0	48.0	48.0	47.0
Heart Girth <sup>109</sup>				
1	31.5	27.5	26.0	24.5
2	35.0	31.5	30.5	28.5
4	42.5	38.5	37.5	36.5
6	48.5	44.0	43.5	42.0
8	54.0	49.0	48.0	46.5
10	57.5	53.0	51.5	50.5
12	60.5	56.0	54.5	53.5
14	63.0	58.0	57.0	55.5
16	65.0	60.0	59.0	57.5
18	67.0	62.0	61.0	59.5
20	68.8	63.5	62.5	61.0
22	70.5	65.0	64.0	62.5
24	72.0	66.5	65.5	63.5

(continued on page 140)

Table XVI.--(continued)

Age of Heifer	Production Goals			
	Holstein	Ayrshire	Guernsey	Jersey
	Weight Pounds <sup>110</sup>			
months	pounds	pounds	pounds	pounds
Birth	90	72	65	53
1	112	89	77	67
2	148	119	102	90
4	243	198	173	158
6	355	293	260	243
8	462	389	350	324
10	552	469	427	393
12	632	538	490	450
14	705	611	556	507
16	782	669	605	558
18	845	725	663	601
20	912	793	712	642
22	987	844	763	684
24	1,069	902	818	733

<sup>107</sup>For this particular enterprise, only production goals are listed since efficiency standards would be difficult to establish.

<sup>108</sup>Hoover and Bruner, op. cit., p. 7.

<sup>109</sup>Loc. cit.

<sup>110</sup>E. W. Neasham and others, "4-H Dairy Calf Club Manual," Extension Publication 1073, Division of Agricultural Extension, Louisiana State University, Baton Rouge, Louisiana, December, 1951.

III. Approved practices recommended for attainment of production goals<sup>111</sup>

(The material below was taken only in part from the sources indicated.)

A. Calving time

A cow that has been properly cared for during the dry period of 6 to 10 weeks should have little difficulty at calving time and should be in excellent physical condition for maximum performance during her lactation period. A cow approaching the time of parturition should be separated from the rest of the dry herd. If at all possible, she should be placed in a roomy, well-bedded box stall that has been thoroughly cleaned and disinfected. However, if this is not possible a small clean pasture close to the barn may be used as a last resort.

Calving time is a critical period for the cow and calf. Although the cow should not be disturbed, she should be observed from time to time and assistance should be given if necessary. Immediately after the calf is born membranes or mucus should be removed from its mouth and nostrils. Artificial respiration is sometimes necessary to start its breathing. If the cow is not able to take care of her calf, it should be rubbed dry with burlap. This is especially important if the air is damp and cold. To avoid navel infection, the navel cord should be clipped off about two or three inches from the body and disinfected with tincture of iodine. By following this practice at Louisiana State University, navel infections have been almost completely controlled. The cow's udder should be washed with warm, soapy water, and weak calves should be given assistance in acquiring their first feeding of milk or colostrum. The calf should start nursing within one hour after birth.

B. Calf quarters

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<sup>111</sup>Rusoff and Frye, op. cit., pp. 6-24.

After 24 hours of age the calf is separated from her dam and placed in a clean, disinfected individual pen. Dairy calves should be raised separately so as to prevent them from sucking or licking each other. This lessens the transmission of disease between calves, prevents the formation of hair balls in the calf's stomach, and prevents the development of a blind quarter. It is recommended by the Nutrition Council of the American Feed Manufacturers Association (24) that the minimum pen size be 24 square feet with solid partitions between pens. Automatic drinking cups are sometimes preferred for calf waterers and should be 20 inches from the floor. They should be located at a front corner of the pen away from the feed. If pails are used for supplying water, they should be kept clean and well filled with fresh water. Feed boxes should be 8" - 10" - 6" deep, and it is desirable to make boxes removable for cleaning. The top of these feed boxes should be 20 inches from the floor and they should be located at the front of individual pens away from the water. Clean bedding should be provided at all times.

A recent development is the use of the raised platform and heavy grating for the calves to stand and rest on. On the raised platform the calves are removed from the cold (wet) floor during the winter months and the bedding remains drier because the urine runs through the grating onto the floor. Since the bedding remains cleaner the calves do not have as great a chance to pick up and eat dirty bedding.

### C. Feeding the calf

#### 1. Colostrum

It is very important that the calf receive colostrum for the first 3 days because of its content of high nutritional and immunizing factors.

The length of time to leave the calf with its dam during the colostrum feeding period is still controversial. However, it is probably best to remove the calf from the dam as soon as possible, so that one will definitely know the amount of milk the calf obtains. At Louisiana State University,



the practice is to allow the calf to nurse its dam for 24 hours; then milk the colostrum and feed it to the calf twice a day. The amount fed at each feed should be at the rate of one-half pound per 10 pounds of body weight (1 lb. per 10 lbs. body weight daily), so that approximately 5 pounds of colostrum will be fed daily to a 50-pound calf.

Within recent years several investigators have recommended extending the period of feeding colostrum to calves until 6 months of age when colostrum is available.

## 2. Milk feeding

To raise a calf as economically as possible it is recommended that the calf be fed a minimum of whole milk, with the main emphasis upon getting the calf on milk replacements or calf starters and hay at an early age. The calf may be raised on its dam or on a nurse cow if there is a surplus of milk.

## 3. Nipple pail vs. open pail

The use of a nipple pail in place of the ordinary open pail is the latest trend in feeding milk. When calves are fed milk from a nipple pail the milk is shunted directly into the fourth compartment or true stomach, where normal milk digestion begins. With ordinary pail feeding, the large swallows of milk exert a pressure against the muscular walls of the esophageal groove so that the milk gets into the underdeveloped paunch or rumen. This milk might undergo fermentation, producing toxic factors which could cause scours and other digestive disturbances.

## 4. Skim milk feeding

Where skim milk is available and a good price is being paid for whole milk, it is economical to replace some of the whole milk with skim milk. Skim milk powder mixed with water (1-9) costs about one-third as much as whole milk.

It is very important to supply a source

of vitamin A in the ration when whole milk is discontinued, since the milk fat is a natural source of this vitamin. A vitamin A supplement in the form of fish liver oil or synthetic vitamin A was used successfully in past studies.

#### 5. Calf starters

In order to raise calves on a limited amount of whole milk, a good calf starter is necessary. It is generally agreed that about a 20 per cent protein starter is required. Vitamin A should be supplemented. It is recommended that the calf starter contain 1 per cent common salt and 2 per cent steamed bonemeal or dicalcium phosphate, or 1 per cent common salt, 1 per cent oyster shell flour and 1 per cent defluorinated phosphate.

In ruminants, only aureomycin, of the antibiotics, has been definitely established as being beneficial to young calves, resulting in increased growth, reduced incidence of scours, improved physical appearance, and better feed efficiency up to 16 weeks of age.

#### 6. Hay

The hay fed to young calves should be the finest-stemmed, leafiest, highest quality hay. The time a calf should be given hay is still controversial. Recommendations range from 1 to 4 weeks.

#### 7. Water

Water should be given to the young calf after milk feeding and should be available at all times. The water should be warm when fed to the very young calf or else digestive disturbances may occur.

#### D. The calf on pasture

Studies at L. S. U. have shown that calves will grow faster and stay in a thriftier condition when barn-fed until about 8-10 months of age than when turned out to pasture at a younger age. Furthermore, observations indicate that they are more resistant to parasitic infestation at 10 months than they are at an earlier age.

## E. Other management practices

First month - During the first month the calf should be dehorned and tagged or tattooed. If scours occurs during milk feeding, the amount of milk should be reduced to one-half the amount fed daily and then gradually increased to the regular amount. In general, nutritional scours is a management problem. The use of the antibiotic aureomycin has reduced the incidence and severity of scours in calves at Louisiana State University. If scours persists, therapeutic or veterinary measures may be required.

After 1st month - After the first month, extra teats should be clipped, and hoofs should be trimmed. Also, the calf can be vaccinated for anthrax, blackleg, and other diseases.

4 to 6 months - Calves can be placed in groups.

8 to 10 months - Calves can be allowed pasture along with grain and hay.

## Breeding Swine

### I. Introduction

#### A. Economic importance

The swine industry is one of the major livestock enterprises of the world. It holds an important position in the agriculture of the United States.

As a source of cash income, the swine industry ranks fifth among the agricultural enterprises of our nation. It is normally surpassed as a source of farm earnings only by cattle and calves, dairy products, cotton, and wheat.

Usually hogs account for as much as 10 per cent of the nation's total farm income. An average of 40 per cent or more of the nation's corn crop is marketed through hogs, and the amount received for these hogs is equal to twice the amount received for the remainder of the corn crop, which is marketed as grain.

Hogs are an important farm supply crop, as well as a major source of income.

In one recent year, more than 12 million hogs were slaughtered on farms to provide meat and lard for the farm families that produced them.

The South ranks first among the regions of the nation in the number of hogs slaughtered on farms. Three states in the South--Georgia, North Carolina, and Texas--average slaughtering more than 800,000 hogs annually for home use. Several additional states in the South use each year more than 500,000 hogs as part of their family meat supply. Many states in the region produce "country cured" hams for sale.

Hogs were first brought to America by the early Spanish explorers who settled along the Gulf Coast. Later, during the early part of the seventeenth century, hogs were brought to New England and Virginia by colonists settling there.

Hogs had been raised in America for several years when, under the rule of Charles I, civil war broke out in England. It was during this war, when England was occupied with her affairs at home, that the American colonies secured the West Indian trade in salt pork and barreled beef.<sup>112</sup>

It is reported by Montgomery,<sup>113</sup> that in 1954 there were 380,000 hogs and pigs on farms in the state of Louisiana, with a farm value of \$7,828,000.

#### B. Areas of Production

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<sup>112</sup>Chapman and Dinsmore, op. cit., pp. 245-246.

<sup>113</sup>Montgomery, op. cit., p. 25.

According to Fitzgerald,<sup>114</sup> it is impractical to divide the state into areas of production.

## II. Efficiency standards and production goals

Table XVII.--Production Goals for the Breeding Swine Enterprise.<sup>115</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Per cent live pigs farrowed raised to weaning	65	90
2. Average number of pigs raised per litter	6.5	8.0
3. Average weight of pigs at 56 days	22	35
4. Selection of meat type hog		
a. Thickness of backfat of 200 pound breeding animal over aitchbone (inches)	*	1.7
b. Length of side of 200 pound breeding animal (inches)	*	20

The figures in this table are studied estimates of the authority cited.

\*Estimates are impractical.

<sup>114</sup>A. D. Fitzgerald, Associate Animal Husbandman, Division of Agricultural Extension, Louisiana State University, Interview, Baton Rouge, Louisiana, September 16, 1955.

<sup>115</sup>Fitzgerald, Interview, September 16, 1955.

III. Approved practices recommended for attainment of production goals<sup>116</sup>

(The material below is taken in part from the source indicated.)

A. Pastures

Green, succulent feeds will reduce the cost of grain feed as much as 20 per cent and the cost of protein feed as much as 50 per cent.

From one-half to one acre of land, depending on the fertility of the soil, should be planted for each sow and litter.

Oats, white clover, crimson clover, red clover, Ladino clover and rye grass are the best crops for grazing from November to May. A mixture of the above crops makes an excellent temporary pasture.

Oats can be used as a green grazing crop during the winter, and can be grazed as a grain crop from the time they get in the dough stage until July. If they are to be used as a grain crop, the hogs should be taken off in March. Then top-dress the oats with nitrate. It is advisable to have white clover or lespedeza inter-planted with the oats. Feeder pigs can be carried on oat grain and clover or lespedeza from May, when the grain is ready, until corn and beans are ready to be hogged-off without any additional feed except minerals and salt. Very few, if any, of the oats will be lost from decay. To figure the carrying capacity of a field of oats, figure that a 100-pound hog will eat five pounds of oats per day. In other words, a bushel of oats will be eaten by a 100-pound pig in six days. A field of oats that yields 30 bushels per acre should carry

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<sup>116</sup>A. D. Fitzgerald, "Swine Production in Louisiana," Agricultural Extension Publication 1089, Louisiana State University, Baton Rouge, Louisiana, June 1951, pp. 2-28.

ten 50-pound pigs for 36 days.

Lespedeza is an excellent crop to graze from May through September.

Sudan grass is excellent for grazing from May through September. It can be grazed when it is six inches high. The Sudan should be clipped when it gets too tall and fibrous.

Soybeans should not be grazed until the plants are 15 to 20 inches high.

Cowpeas give quicker grazing than soybeans.

Alfalfa is the best pasture for hogs, and should be used more by hog producers for grazing in the spring and summer on soils where the crop can be successfully grown.

Allyce clover is also very good for summer and fall grazing.

#### B. Sanitation

Sanitation, keeping the place clean, is the first rule for profitable livestock production. With the exception of hog cholera, which can be controlled by immunizing the pigs, the principal causes of the loss of pigs and loss of gains are internal parasites and filth-borne diseases that can be controlled by sanitation. A simple and practical plan for raising healthy hogs is to produce them on a rotated clean ground that has been planted in grazing and hogging-off crops. By keeping the hogs away from such contaminated places as barnyards, swampy and wet, shady places, worm infestation can be kept to a minimum.

#### C. Rations

The following rations may be used as a guide for feeding sows and pigs on pasture. If good green succulent grazing is not available, replace ten pounds of grain in the sow's ration with ground legume hay and five pounds of grain with ground legume hay in the pig's ration. Minerals and salt should be self-fed with all rations.

## Brood Sows

Corn	90	Ground corn	70
Tankage or shrimp meal	4	Ground oats	20
Cotton seed meal or soybean meal	6	Tankage	5
		Cottonseed meal or tankage	5

## Pigs - Weaning to 50 pounds

Corn	74	Corn	60
Tankage or shrimp meal	10	Ground oats	15
Cottonseed meal or soybean meal	16	Tankage or shrimp meal	10
		Cottonseed meal or soybean meal	15

## Pigs - 50 to 100 pounds

Corn	79	Corn	65
Tankage or shrimp meal	8	Ground oats	15
Cottonseed meal or soybean meal	13	Tankage or shrimp meal	8
		Cottonseed meal or soybean meal	12

Because garbage varies in feeding value, garbage-fed hogs do not usually produce as fine a carcass as grain-fed hogs, but municipal garbage will produce about 40 pounds of live-weight per ton. Garbage of excellent quality may produce up to a 100 pounds of pork per ton.

## D. Adequate equipment

A minimum amount of investment in buildings is needed in Louisiana due to the mild climate. Inexpensive equipment, which can be constructed on the farm, will save labor and increase the percentage of pigs raised. Shelters and other equipment should be constructed so that they can be moved from one field to another.

Self-feeders should be used when feeding market hogs. Self-feeders save labor and feed and the hogs make faster gains. Other equipment which one should have includes a central farrowing house, hog wallow, electric pig brooder, and a pig creep.



#### E. Hog Wallows

Hogs do not sweat. They must have shade in the summer and should have a sanitary wallow or a sprinkler under a shed that has a concrete floor. Avoid mud wallows in lots and pastures for young pigs and breeding stock, as these wallows are good sources of infestation for worms and diseases.

#### F. Selection of breeding stock

The selection of a breed is largely a matter of individual preference. The selection of type in breeding stock is more important than selecting the breed. The intermediate type is recognized as being the most profitable all-purpose hog. This type will make fast gains and yield good carcasses. The "rangy" type usually will not fatten enough to produce good carcasses until the animal weighs over 250 pounds. The "chuffy" type often becomes too fat at weights that are too light to make economical gains.

#### G. Control of external and internal parasites

Worms are one of the most serious problems in raising hogs in Louisiana. Most of the worms can be controlled by sanitation and by rotating pastures that are grazed by hogs.

Round worms probably cause the most damage and can be most effectively controlled by using sodium flouride. Lung worms and kidney worms can be controlled only by raising hogs under sanitary conditions.

Mange can be controlled by spraying or dipping the hogs with benzene hexachloride or by spraying with lindane or chlordane. When spraying, be sure to wet inside the ears and under the flanks.

Lice can be controlled with benzene hexachloride, lindane or chlordane when treating for mange. Crank case oil from a tractor or automobile, applied by spraying or by pouring a small amount on the hog's back, will also control the lice. Lice can also be controlled by spraying the hogs and hog houses with a 0.5 per cent DDT solution. This solution is made

by using eight pounds of 50 per cent wettable DDT powder to 100 gallons water.

#### H. Disease control

##### Hog Cholera

The symptoms of hog cholera are high fever, loss of appetite, and weakness. The sick animal may seek a dark damp corner or pile of straw and try to hide. Its skin may turn a dark red or purple. Its eyes may be inflamed. The early symptoms of hog cholera may be confused with those of flu.

After hogs show symptoms of hog cholera, little can be done, except to isolate the sick animals and vaccinate the ones that still are healthy.

All pigs should be vaccinated against hog cholera when six to seven weeks old. Vaccination of healthy pigs is almost 100 per cent effective in controlling hog cholera.

A tissue type vaccine also has been developed and it can be used safely by farmers who are raising their own pigs, but this vaccine will not be effective for more than nine months.

##### Necrotic Enteritis

The true cause is unknown. The symptoms are high fever, lack of appetite, severe diarrhea and unthriftiness. Enteritis usually attacks pigs from six weeks to four months of age.

Necrotic enteritis can be controlled by giving the pigs a well balanced diet that is high in vitamins and contains milk or tankage. A good sanitation program is essential for prevention. The pigs should be moved to clean ground that has been planted in a legume. Keep them well bedded and furnish them with plenty of clean drinking water.

##### Flu (Influenza)

Hog "flu" is an infectious disease which usually occurs during the fall and winter. It

is highly contagious and once contracted usually affects the entire herd. Hogs that are roughly handled and hauled for a long distance are likely to come down with flu.

The symptoms of flu are high fever, no appetite, cough, discharge from nose and eyes, and abdominal breathing or "thumps."

There is no vaccine that protects hogs against flu. The best treatment is to withhold feed, provide the animals with warm dry pens, and separate the sick hogs from the ones that are healthy. The sick hogs should not be fed until they are hungry. Bring them back to full feed gradually.

### Brucellosis

The most prominent symptoms of Brucellosis in a sow are failure to breed, abortion, which usually occurs about the third month of pregnancy, and a high percentage of the pigs born dead at the termination of pregnancy. This disease has a very bad effect on the animal and makes it very susceptible to other diseases. The Brucellosis infection in a boar may be very serious.

There is no known treatment for Brucellosis or "bangs" in hogs. It is difficult to eradicate after it becomes established, but it can be eradicated and controlled by a rigid program of testing and isolation. All breeding animals should be tested several weeks before the breeding season and the reactors sold for slaughter. Breeding animals bought should be negative to the blood test and should be from a Brucellosis-free herd.

## I. Year-round farrowing program

Breeding of the sows in the herd should be staggered to allow for year-round farrowing in order to distribute the farm labor and be assured of a range of market prices.

## Fattening Swine

### I. Introduction

### A. Economic importance

For many years the hog has supplied meat and lard, two important food products, to man. The hog has supplied these two high-quality food products so efficiently that he stands second only to cattle in the tonnage of meat contributed annually to the food supply of the world. Pork possesses some advantages over beef as a food, and except that the hog is much more limited in his adaptations to production, it is probable that a larger amount of pork than beef would be consumed. In those countries favorable to swine raising, consumption of pork usually slightly exceeds consumption of beef.

The hog is the most efficient of all farm animals in converting pounds of feed into pounds of meat, but because of his small, simply constructed digestive tract, he can best use the seeds and concentrated parts of plants that are low in fiber content and high in digestible nutrients. Where such feeds are available at low cost, several characteristics of hogs favor their economical production as compared with other farm animals. The most important of these factors are as follows: (1) The capital investment for equipment and breeding stock is low in proportion to gross returns. (2) Returns on the initial investment in breeding stock and equipment are secured in a comparatively short time. (3) The hog is the most efficient of all farm animals in converting concentrate feeds into meat.<sup>117</sup>

There is usually a good demand in Louisiana for good butcher hogs at all seasons of the year, either locally or on central markets. In Louisiana, prices are usually highest from July to October.<sup>118</sup>

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<sup>117</sup>Peters and Grummer, op. cit., p. 209.

<sup>118</sup>Fitzgerald, op. cit., p. 22.

## B. Areas of production

According to Fitzgerald,<sup>119</sup> it would be impractical to divide the state into areas of production.

## II. Efficiency standards and production goals

Table XVIII.--Production Goals for the Fattening Swine Enterprise.<sup>120</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Live weight at 56 days	22	35
2. Live weight per pig marketed	250	225
3. Total days of age to reach 225 pounds	230	170
4. Gain per day after 56 days	1.3	1.8
5. Pounds of feed per pound of gain after 56 days	4.7	3.5

The figures in this table are studied estimates by the authority cited.

## III. Approved practices recommended for attainment of production goals<sup>121</sup>

<sup>119</sup>Fitzgerald, Interview, September 16, 1955.

<sup>120</sup>Fitzgerald, Interview, September 16, 1955.

<sup>121</sup>Fitzgerald, op. cit., pp. 13-24.

(The material given below is taken in part from the indicated source.)

A. Well balanced ration

1. Feed antibiotics to pigs up to 75 pounds.
2. Provide fresh clean drinking water.
3. Provide pasture as described for breeding swine.

B. Provide an adequate hog wallow

It is very necessary that hogs on full feed, that are being finished for market in August and September, have access to a wallow. Experiments have shown that hog wallows can increase gains by as much as one-half pound per day. A concrete hog wallow will take care of three times as many hogs as can get into the wallow at one time. A hog wallow 10 feet by 10 feet will take care of about 45 hogs. This estimate is based on finished weight of 220 pounds.

C. Provide adequate shelter and shade

D. Marketing

There is usually a good demand in Louisiana for good butcher hogs at all seasons of the year, either locally or on central markets. In Louisiana hog growers can have their sows farrow in January and February and have corn ready to feed in July; they can feed out pigs so they will be ready to market in August and September when prices usually are highest. Fall pigs should be marketed in March or April. However, prices are usually lower then than they are in September.

The most profitable market weights are from 180 to 220 pounds. Hogs weighing over 225 pounds do not make as economical use of their feed and are not as desirable on Louisiana markets.

Careful handling and management of hogs from farm to market will pay dividends. Rough handling will result in bruised, crippled and dead hogs.

E. Practice good sanitation measures

## Market Egg Production

### I. Introduction

#### A. Economic importance

Poultry production is America's most popular food enterprise. Chickens are kept on about nine out of every ten farms in the country. In addition, millions of town and city families keep backyard flocks to produce meat and eggs for home use. No other food producing business is so widely distributed; none interests a larger number of people.

America's poultry industry is a big business. The annual income to poultry producers from the sale of meat and eggs has, for many years, been more than two billion. Poultry accounts for approximately fourteen per cent of the nation's farm income.

Chickens merit a place in the production program of every farm, both large and small. The enterprise is adapted to the entire nation; it may be conducted successfully in every community, regardless of location. While America was not the original home of the most popular domestic fowl, the chicken, our people have expanded the production of this source of meat and eggs until the United States now has almost as many chickens as all other countries of the world combined.

With something like six per cent of the world's population, the United States has more than fifty per cent of the world's chickens. In one recent year when the United States was credited with 530 million chickens, the second ranking nation was China with 184 million. No other nation had more than 60 million. Among the top-ranking nations, other than the United States and China, we find Canada, England, Italy, Switzerland, Argentina, Brazil, and French Morocco in Africa. Some chickens are produced on every continent in the world.

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Poultry products were not bought and sold until about 100 years ago. It is interesting to note that the first poultry products offered

for sale in the United States through established channels of trade were feathers. Feathers were used to make beds, pillows, and other household furnishings; cotton mattresses were unknown at this period of our history. Also, of course, feathers were shipped by the early settlers to England and other countries of the Old World.

From these modest beginnings our present extensive poultry industry was developed. Today it embraces millions of producers--more than five million families living on farms and perhaps an equal number residing in towns and villages and suburban homes. This number represents approximately one-third of all the homes in the United States. In addition to these millions of producers, the poultry business embraces thousands upon thousands of commercial and industrial workers engaged in assembling, processing, grading, packing, transporting, and selling poultry and eggs.

Consumption of poultry meat has increased in the United States until today each person in our country eats thirty pounds of dressed poultry every year. That is not a large amount in terms of the entire meat requirements for an adequate diet, but to supply the commercial demands more than two billion pounds of dressed chickens, turkeys, ducks, and geese must be provided. This task furnishes employment for many urban workers.<sup>122</sup>

Laying flocks have changed materially in Louisiana during the past five years. Trends have developed toward larger flocks, more eggs per hen, and better feed conservation. The poultry business in Louisiana is growing up.

Larger commercial laying flocks have been the trend in 1953. Flock owners have developed larger flocks by more efficient management, labor-saving devices, with more efficiency in marketing, resulting in increased profit to

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<sup>122</sup>James B. Cooper, Poultry For Home and Market (Atlanta, Georgia: Turner E. Smith & Co., 1950), pp. 1-7.



the flock owners.<sup>123</sup>

B. Areas of production<sup>124</sup>

The variation in production in areas of the state does not justify division of the state into production areas due to their lack of uniformity.

II. Efficiency standards and production goals

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<sup>123</sup>Clyde Ingram and Stella Jones, "Handbook of Improved Poultry Management Practices," Division of Agricultural Extension, Louisiana State University, Baton Rouge, Louisiana, 1954, p. 3.

<sup>124</sup>Alva Burl Watts, Professor and Head of the Poultry Department, Louisiana State University, Baton Rouge, Louisiana, Interview, September 5, 1955.

Table XIX.--Production Goals for the Market Egg Production Enterprise.<sup>125</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Eggs per layer per year (hen day basis)	150	200
2. Eggs produced per layer in September, October, and November	35	50
3. Total per cent mortality	20	15
4. Total per cent removed as poor layers (A high per cent indicates poor chick selection)	40	25
5. Pounds of feed per dozen eggs	5.5	4.5
6. Per cent eggs marketed in highest quality grades	50	75

The figures in this table are studied estimates by the authority cited.

### III. Approved practices recommended for attainment of production goals<sup>126</sup>

(The information given below is taken only in part from the source cited.)

#### A. Young stock

1. Adequate equipment, sanitation methods, and good feeding should receive first consideration in producing young stock.
2. Secure chicks for the purpose for which they are to be used (if strictly for egg

<sup>125</sup>Alva Burl Watts, Interview, September 5, 1955.

<sup>126</sup>Ingram and Jones, op. cit., pp. 4-10.

production, egg bred strains should be used. If for meat or broiler production, broiler type bred chicks should be used.)

3. Get chicks early. Arrange for heavy breed chickens to be hatched in February. Light breeds may be hatched in February, March and the first of April.
4. If you have a special market for market eggs in June, July and August, then chicks should be hatched six months before you expect these eggs which means starting chicks in the fall of the year.
5. Provide ample floor space for chicks, one square foot of floor space per chick.
6. Use a good dependable brooder unit, utilizing electricity or gas.
7. Provide adequate feeding and water equipment as follows:
  - a. Chick feeders (two 3-foot feeders per 100 chicks for the first three weeks.)
  - b. Intermediate feeders (three 3-foot feeders per 100 chicks to 8 weeks of age.)
  - c. Range feeders for mash and grain (three 5-foot feeders per 100 birds.)
  - d. Ample water fountains (float and barrel type.)
  - e. Feeding and watering frames covered with wire netting.
8. Provide range shelters for growing young stock on range. One shelter (10 X 12 feet in size) is necessary for each 125-140 pullets. No type of equipment is more valuable.
9. Arrange a definitely planned 3 area range and pasture system for young stock for rotation over a three-year period. These ranges need no fencing and can be near the dwelling, if the old flock is yarded. These ranges could be the same areas provided and used as clean pasture for other livestock. One acre for each 1,000 pullets.
10. Brood chicks for replacement flocks at least 100 steps from the old hens.

#### Vaccination program

- a. Vaccinate chicks with combination Bronchitis-Newcastle vaccine at 7 to 10 days of age, or when they are taken out of the ring around the brooder.
- b. Vaccinate for chicken pox at 8 to 10 weeks of age.

- c. Give a booster vaccination of Bronchitis-Newcastle combination vaccine at 14 to 16 weeks of age.

#### Restricted feeding program

Top quality pullets can be produced on a controlled or restricted feeding program, provided certain basic principles are followed. Briefly, here are the things that must be considered.

- a. Restricted or controlled feeding will not work unless you have an abundance of tender green feed.
- b. In following this type of feeding program the young chicks should be on full feed for the first 8 or 9 weeks.
- c. Start the restricted program at 8 or 9 weeks of age and continue to 5 months of age. Feed approximately five pounds of heavy-grade whole oats and five pounds of growing mash per hundred pullets per day.
- d. As the pullets begin to get older, gradually increase the growing mash.
- e. When the pullets are in 10 per cent production they can be put on a full feeding program and given all the mash they can clean up.
- f. Summer management is important in growing strong, vigorous, healthy pullets. The restricted growing mash with an abundance of tender green feed will grow good pullets with big frame, good body size, ready to be put on full feed when they begin production.
- g. The restricted or controlled feeding program for pullets will work best when they are housed in units of 100 to 125 pullets per house and where they have plenty of tender grazing crop available near the range shelters.
- h. Following are some of the grazing crops that give excellent grazing: Lespedeza, Bermuda grass, sweet Sudan grass, and Alyce clover.
- i. Pullets on a restricted feeding program should have plenty of granite grit feed at free choice.
- j. Keep the grass on the range short to provide tender grazing for short grass has more food value. Avoid contaminated spots on the range.

## B. Laying flock

One hundred laying hens averaging 60% production through the year will require approximately 4 tons of feed for Leghorns and approximately 5 tons for meat type birds. This can be fed in the form of an all mash ration which does not require any additional grain feeding.

A grain mash system of feeding can also be used in which approximately equal parts of mash and grain are fed to the layers. This mash should be a highly fortified 20% protein mash.

The grain in the case of Leghorns can be made of approximately yellow corn chops, milo or wheat and heavy oats.

In the case of the heavy breeds the grain ration should be composed entirely of top quality heavy oats. Oat feeding will prevent excessive fattening of the meat type hens.

Proper feeding, management, good housing and equipment are essential for the laying flock. Adequate room and equipment should be provided. Crowding reduces egg producing efficiency and increases the hazards of disease and cannibalism. The poultry enterprise should be so located within the farmstead arrangement as to provide convenience, save steps, and insure efficiency in operation.

With good management in growing pullets it will cost somewhere between \$1.50 and \$2.25 per bird to put a pullet in the laying house. The varying in cost will depend on efficiency of management, disease control measures, and the amount of tender green feed available during the growing season.

A conservative estimate as to the profit per bird at the end of the laying season is \$2.00 to \$2.50 above all expenses. This again will depend on the efficiency of operations and the following of a good management program.

1. For comfortable housing, provide a laying house with the following features:
  - a. Allow at least 3 square feet of floor space for Leghorns and 4 square feet of floor space for the heavy breeds.

- b. The most economical house is a house 30 to 40 feet wide. The length will be determined by the number of pullets to be housed.
- c. Laying house should have floor ventilation at least 3 feet wide all way around the bottom of the house with adequate top ventilation.
- d. Dirt floor at least 12 inches higher than the outside ground with built up litter.
- e. 8 inches of roosting space per bird installed as dropping pits.
- f. Feed room conveniently located in the laying house.

## 2. Feeders, waterers, nests

- a. Allow 35 to 40 feet of feeder space per 100 laying pullets.
- b. Use low type feeders to increase feed consumption.
- c. Provide abundance of clean fresh water. 100 pullets will consume 6 to 8 gallons of water a day. Use a two-two and one-half gallon water bucket or one 5 foot automatic water fountain for each 100 hens. Lack of water will decrease egg production.
- d. Provide for feeding oyster shell and grit.
- e. Allow 20 individual nests for each 100 hens.
- f. Add fresh mash daily and stir mash three or four times a day.

## 3. General management

- a. House pullets before they start laying, so they will get used to new houses and equipment.
- b. Pullets should be housed at five and one-half months of age and kept confined. Start feeding laying mash when pullets are in ten per cent production or when pullets are placed in the laying house at about five and a half months of age.
- c. House pullets according to maturity. Slow maturing pullets may be brought into production by separating them from the rest of the flock and encouraging greater mash consumption. These pullets are timid and won't eat when left with rest of flock.

- d. Feed a high quality laying mash (20% protein mash supplemented with grain. If the mash is 16 to 18% protein, it is an all-mash feed and no grain is to be fed.) Keep mash before the pullets at all times.
- e. Provide lights for increasing all production so that there will be a total of 14 to 16 hours of light a day from the time the pullets are in 20% production. Provide at least one watt per bird from the start. Lights give the birds the go ahead signal. Lights should be spaced 10 feet apart and 5 to 6 feet from the floor.
- f. Replace the entire laying flock with pullets after the flock has been into production 12 to 15 months.
- g. Try to hold production to 50% or better by following a good culling program.
- h. Keep accurate records, summarize and analyze the results.

4. Produce maximum number of clean eggs by:

- a. Confining the layers will aid in the production of clean top quality eggs.
- b. Using built up litter--remove only one a year.
- c. Gathering eggs 2 to 3 times a day or more if necessary.
- d. Darkening nests.
- e. Using clean nesting material.

5. Handling of eggs on farm

- a. Gather eggs in wire baskets and allow them to cool before packing.
- b. Put eggs under some kind of refrigeration immediately on gathering. Whatever you may use to keep them cool, the temperature should be under 60° F. Eggs freeze at 28° F. so do not put them in a freezer.
- c. Eggs storage room should be reasonably damp with a relative humidity of 70 to 75 degrees.
- d. Pack eggs with the little end down in clean cases with clean fillers that have been pre-cooled. This places the air cell on the top of the eggs which is the natural position for it.

- e. Eggs should be marketed two or three times a week.

### Hen cages

Hen cages are new for Louisiana poultry people. It is the newest method for handling laying hens for commercial egg production.

Certain advantages of the cage system make it attractive to many producers.

#### 1. Advantages

- (1) High feed efficiency through maintenance of high rate of production.
- (2) Provides accurate culling and helps to reduce feed cost per dozen of eggs-- One dozen eggs can be produced in hen cages on 3.8 to 4.4 pounds of feed per dozen of eggs.
- (3) Early recognition of birds going out of production or out of condition-- lowers mortality--higher cull value.
- (4) Cannibalism is eliminated and losses from internal and external parasites are reduced.
- (5) Provides a uniform egg production on 12 months basis.
- (6) Improved egg quality.
- (7) No pick outs.

#### 2. Problems

Management problems which are foremost in a caged layer operation include:

- (1) How often to brood flock replacement?
- (2) What kind of bird to use?
- (3) What disease problems are created by overlapping broods?
- (4) What is the best ration and feeding program for caged layers?
- (5) How minimize the number of broken eggs?
- (6) How produce the maximum number of clean eggs?
- (7) What is the best water system?
- (8) How control the flies?

#### 3. Type of building equipment



- (1) A 24 foot wide house open on all four sides is the best adapted for hen cages.
- (2) A 24 foot wide house will allow for three double rows of cages with space in-between for watering and feeding aisle.
- (3) One thousand laying hens in cages will require a building 24 x 156 feet.  
(This will give room for feed storage.)

#### Cost for housing layers in cages

Five installations of hen cages in Central Louisiana show an average cost for 1,000 laying hens as follows:

Cost of raising mature hens.....	\$1.75
Cost of cage.....	1.25
Cost of replacements per cage...	.30
Cost of hen house per cage.....	2.25
Cost of range houses, brooder house.....	.35
	<u>\$5.90</u>

- (4) To house 1,000 pullets in cages it will be necessary to start 1,250 sexed day old pullets and follow a good management program.
- (5) To keep this thousand cage unit full of hens in maximum production, it will be necessary to start 200 sexed day old pullet chicks every two months during the year.
- (6) The Red River Egg Company in Alexandria, Louisiana, has operated hen cages for a complete year. The cost of producing one dozen eggs over the one year period including the cost of feed, water, electricity, disinfectants, fly sprays, vaccinations, and money lost on replacements and mortality was 28 cents per dozen. This does not include any labor cost. Over the same period the average net price received for the eggs was 50 cents a dozen and the average daily production was 74%.
- (7) One possible source of by-product income is from the droppings, which are cleaned out once a year. It is estimated that in a year's time 1,000 hens will accumulate 25 tons of droppings. At a

price of \$20.00 per ton, which it should be possible to obtain, this would amount to \$500.00.

#### 4. Starting hens in cages

- (1) The first problem in starting with the 1,000 unit hen cage is to build your building 24 x 156 feet and use half for brooding your first 1,250 chicks.
- (2) Brood them in units using three 500 capacity floor type gas brooders dividing chicks into three equal lots. Keep the chicks in this building until they are six to eight weeks of age depending on the season of the year when the chicks were started.
- (3) If 24 x 156 house is on clean ground where chicks haven't been before, then half of the chicks can be grown out in this building and half moved to range houses.
- (4) Build six 10 x 12 range houses to take care of 625 growing pullets after they are six to eight weeks of age.
- (5) Place the range houses on good grass pasture that has a good thick sod of lespedeza, bermuda or some other grazing crop.
- (6) Leave the pullets on the range and in half of this house until they are approximately 5 months of age.
- (7) Take the half of the building that has not been used for growing the young pullets and hang the hen cages and house the pullets that have been grown in the 24 x 156 house.
- (8) Hang cages in the other half of the house where pullets were grown and move pullets grown on the range and put in hen cages. This will save in building extra range shelters.

#### 5. Brooder house

- (1) The brooder house should be built at least 100 steps from any hens on the farm. A 10 x 12 or 12 x 18 brooder house will give enough room for 200 chicks that have to be brooded every two months.

- (2) The 200 chicks that are started can be kept in the brooder house until six to eight weeks of age and then moved to two 10 x 12 range houses.
- (3) The growing stock should be raised on ground that hasn't had chickens for at least a year. Move each batch of chicks grown on the range to new location to avoid disease and worm contamination.

#### 6. Culling

There are a number of systems for keeping records of egg production of hens in cages. The one most commonly used is the ordinary clothespin. Arranging the clothespin on the cages so that it can be moved with everyday's egg production. In other words if the hen lays today, the clothespin is moved one notch. At the end of two weeks you can tell the production of that hen in the cage. If she has not layed seven eggs in 14 days then she should be culled.

#### 7. Vaccination

Newcastle, Bronchitis and Chicken Pox vaccination is a must in hen cage operation.

#### 8. Breed to use

Most cage operators have found production bred White Leghorns most profitable. Strain is more important than the breed.

Chickens should be bred for:

- (1) Resistant to Leucosis (Blindness and Paralysis)
- (2) High egg quality, good shell texture, freedom from blood spots, with thick albumen.
- (3) Freedom from tendency for blow-outs.
- (4) Freedom from broodiness.

#### 9. Fly control

There are a number of good insecticides available for fly control. Any successful control program must be aimed at the control of fly breeding. It is necessary to have a consistent spraying program to satisfactorily

control fly breeding. Permitting the droppings to build up in cones under the cages reduced the fly breeding and saves time and insecticide. Malathion in a 1.25 - 2.50 per cent solution is effective as a larvacide or as a residual spray. Mop strings soaked in a 25% solution of Malathion tied to a cord at two foot intervals and suspended where the adult flies tend to congregate or roost is an effective killer. Care should be exercised to suspend the cord where the killed flies will not fall into the feed or water troughs.

## Broilers

### I. Introduction

#### A. Economic Importance

Commercial broiler production is a new and important segment of the poultry industry. This field of specialization has been growing rapidly during recent years; it will continue to grow in the future.

A broiler, as everyone knows, is a young chicken. From a commercial point of view, it is a chicken raised exclusively for meat. According to the U. S. Classes for Dressed Chickens, broilers are defined as young chickens, approximately eight weeks old, of either sex, of marketable age, but not weighing over 2 and one-half pounds and sufficiently soft meated to be cooked tender by broiling. Fryers, which are closely related to broilers from a commercial standpoint, are officially defined, for market purposes, as young chickens, approximately thirteen to twenty weeks old, of either sex, weighing more than two and one-half pounds, but not more than three and one-half pounds, and sufficiently soft meated to be cooked tender by frying. Roaster, incidentally, is a young chicken weighing more than three and one-half pounds. For all practical purposes, broilers are young chickens raised and sold for meat. The weight at which they are sold will be determined by local market requirements. For this work the term broiler will be used exclusively without regard to the weight of the birds produced; but from a production point of view, it is assumed that

normal lots of chicks will be finished for market within a period of twelve weeks or less, therefore, the vast majority will be properly classified from every viewpoint as broilers.<sup>127</sup>

The change in commercial broiler production is even more striking for the past few years. The number produced in 1950 was two and one tenth million; in 1951, four and five tenths million; 1952, eight million; and in 1953, better than thirteen million broilers were grown in Louisiana. Louisiana continues to offer opportunity for efficient production in marketing top quality broilers.

The trend at the present time is for a broiler bred for quick growth, rapid feathering, short legs and broad breasts. The tendency is toward a chicken with an extremely light under color, or preferably, a white chicken. A white chicken is easier dressed; pin feathers are not as prominent.<sup>128</sup>

#### B. Areas of production<sup>129</sup>

The Marthaville and Ruston areas produce about two-thirds of the broilers in the State of Louisiana. It is impractical to divide the state into areas according to production levels.

## II. Efficiency standards and production goals

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<sup>127</sup>Cooper, op. cit., p. 269.

<sup>128</sup>Ingram and Jones, op. cit., p. 2.

<sup>129</sup>Watts, Interview, September 6, 1955.

Table XX.--Production Goals for the Broiler Production Enterprise.<sup>130</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Per cent chicks raised to market age	90	95
2. Weight per bird at 5 weeks, straight run	1.0	1.25
3. Weight per bird at 10 weeks, straight run	2.75	3.00
4. Lb. of feed per lb. liveweight to 10 weeks of age	2.9	2.7
5. Per cent broilers marketed in highest quality grade	75	90

The figures in this table are studied estimates of the authority cited.

### III. Approved practices recommended for attainment of production goals<sup>131</sup>

(The information given below is taken only in part from the source cited.)

A 40 x 100 foot broiler house that will accommodate 4,000 baby chicks will cost in the neighborhood of \$2,500 to build and equip. This is the minimum taking into consideration that the house will have to be built out of creosoted posts and substantial but reasonably priced material.

The profit per chick will vary somewhere between five and ten cents per chick started.

<sup>130</sup>Watts, Interview, September 5, 1955.

<sup>131</sup>Ingram and Jones, op. cit., pp. 11-12.

It is important in broiler production to obtain high feed efficiency and a profitable return per hour labor expended. Some important factors to consider in accomplishing this are:

1. Purchase top quality broiler strain chicks from a Pullorum Free hatchery.
2. Raise a minimum of 4,000 to 10,000 per brood.
3. Provide 1 square foot of floor space per chick.
4. Start all chicks at the same time and market the entire lot of birds at one age--completely depopulate the broiler house after each brood of chicks.
5. Leave broiler house empty of chicks for two weeks before starting a new brood of chicks.
6. Allow plenty of fresh air floor ventilation and adequate roof ventilation.
7. Four broods can be produced in a year's time.
8. A feed room, automatic feeder and track and carriers and automatic waterers are essential.
9. Good feed is essential. Approximately 70 per cent of the cost of production is for feed.
10. Provide adequate feeding and watering equipment:
  - (1) For each 500 chicks allow 8 to 10 three foot feeders until three weeks of age.
  - (2) After two to three weeks of age provide 15 four foot feeders for each 500 birds.
  - (3) Automatic feeders used as recommended reduces labor.
  - (4) Provide 5 one to two gallon waterers per 500 chicks up to three weeks of age.
  - (5) After three weeks of age provide 2 four foot automatic waterers for each 400-500 birds. Chicks should not have to walk more than ten feet for water.
11. Three factors are absolutely necessary for success:
  - (1) Good chicks. (2) Good feed.
  - (3) Good management.

12. If regular brooder stoves are used, provide one for each 500 chicks.
13. Provide one square foot of floor space per chick.
14. The use of a good sanitation and disease control program is essential.
15. If Newcastle is present in the community, vaccinate day old chicks for Newcastle.

### Hatching Egg Production

#### I. Introduction

##### A. Economic importance

The change that has taken place in the size of flocks participating in the Louisiana Poultry Improvement Association Program is a striking illustration of the changing times. In 1940, the average number of birds per flock was 68 hens; 1946-1950, the flock averaged 115 birds; and in 1951 there were 222 birds per flock. In 1953 there were 709 birds per flock.

Louisiana has forty-five hatcheries cooperating with the National Poultry Improvement Plan, with a hatching capacity of a little better than two million eggs every three weeks.

The trend has been toward fewer hatcheries, but increased hatching capacity, and there is a trend toward fewer hatchery supply flocks. Not only are hatcheries getting larger, but they are hatching at all seasons of the year.

We would like to further point out some interesting facts that are going to affect prices in the future. Broiler growers have not had very favorable prices in the past few months. However, in face of these lower prices, the better producers have continued to make money.

With the lower broiler prices, it has had a tendency to encourage increased production of laying flocks for market eggs. Market egg prices may not be as good this fall and winter as we have seen in some of the past years. Again, it is going to take efficient management



and marketing to show a profit.

There is a trend throughout the South for increased use of hen cages in commercial egg production. It will cost approximately \$5.50 per bird to put a laying pullet in production, using hen cages. This includes the cost of producing the pullet, the house, and the hen cages. We believe that only the most efficient poultry producers will succeed with hen cages. Good poultrymen can take hen cages, pullets ready for production and grown right, and make money with hen cages.

Louisiana farmers and poultry people are in need of definite reliable information on all phases of poultry production and assistance in many poultry problems.<sup>132</sup>

B. Areas of production<sup>133</sup>

According to the authority cited, the variation throughout the state in production of hatching eggs is not sufficient to warrant division of the state into production areas. Approximately two-thirds of the hatching eggs in the state are produced in the Hammond and Napoleonville areas.

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<sup>132</sup>Ingram and Jones, op. cit., pp. 2-3.

<sup>133</sup>Watts, Interview, September 6, 1955

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<sup>132</sup>Ingram and Jones, op. cit., pp. 2-3.

<sup>133</sup>Watts, Interview, September 6, 1955

## II. Efficiency standards and production goals

Table XXI.--Production Goals for the Hatching Egg  
Production Enterprise.<sup>134</sup>

Efficiency Factors	Efficiency Standards	Production Goals
1. Eggs per layer per year (hen day basis)	115	150
2. Total per cent mortality	20	15
3. Total per cent removed as poor layers (A high per cent indi- cates poor chick selection)	50	35
4. Lbs. of feed per dozen eggs	9	8
5. Per cent of eggs of hatching quality	70	85
6. Per cent fertility	80	90
7. Per cent hatchability (per cent of fertile eggs which hatch)	70	80

The figures in this table are studied estimates of the  
authority cited.

## III. Approved practices recommended for attainment of production goals<sup>135</sup>

(The information given below is taken only in part  
from the source cited.)

<sup>134</sup>Watts, Interview, September 5, 1955.

<sup>135</sup>Ingram and Jones, op. cit., pp. 4-8.

### A. Young stock

1. Adequate equipment, sanitation methods, and good feeding should receive first consideration in producing young stock.
2. Secure chicks for the purpose for which they are to be used (if strictly for egg production, egg bred strains should be used. If for meat or broiler production, broiler type bred chicks should be used.)
3. Get chicks early. Arrange for heavy breed chickens to be hatched in February. Light breeds may be hatched in February, March and the first part of April.
4. If you have a special market for market eggs in June, July and August, then chicks should be hatched six months before you expect these eggs which means starting chicks in the fall of the year.
5. Provide ample floor space for chicks, one square foot of floor space per chick.
6. Use a good dependable brooder unit, utilizing electricity or gas.
7. Provide adequate feeding and water equipment as follows:
  - a. Chick feeders (two 3-foot feeders per 100 chicks for the first three weeks.)
  - b. Intermediate feeders (three 3-foot feeders per 100 chicks to 8 weeks of age.)
  - c. Range feeders for mash and grain (three 5-foot feeders per 100 birds.)
  - d. Ample water fountains (float and barrel type.)
8. Provide range shelters for growing young stock on range. One shelter (10 x 12 feet in size) is necessary for each 125-140 pullets. No type of equipment is more valuable.
9. Arrange a definitely planned 3 area range and pasture system for young stock for rotation over a three-year period. These ranges need no fencing and can be near the dwelling, if the old flock is yarded. These ranges could be the same areas provided and used as clean pasture for other livestock. One acre for each 1,000 pullets.
10. Brood chicks for replacement flocks at least 100 steps from the old hens.

### Vaccination Program

- a. Vaccinate chicks with combination

Bronchitis-Newcastle vaccine at 7 to 10 days of age, or when they are taken out of the ring around the brooder.

- b. Vaccinate for chicken pox at 8 to 10 weeks of age.
- c. Give a booster vaccination of Bronchitis-Newcastle combination vaccine at 14 to 16 weeks of age.

### Restricted Feeding Program

Top quality pullets can be produced on a controlled or restricted feeding program, provided certain basic principles are followed. Briefly here are the things that must be considered.

- a. Restricted or controlled feeding will not work unless you have an abundance of tender green feed.
- b. In following this type of feeding program the young chicks should be on full feed for the first 8 or 9 weeks.
- c. Start the restricted program at 9 or 10 weeks of age and continue to 5 months of age. Feed approximately five pounds of heavy-grade whole oats and five pounds of growing mash per hundred pullets per day.
- d. As the pullets begin to get older, gradually increase the growing mash.
- e. When the pullets are in 10 per cent production they can be put on a full feeding program and given all the mash they can clean up.
- f. Summer management is important in growing strong, vigorous, healthy pullets. The restricted growing mash with an abundance of tender green feed will grow good pullets with big frames, good body size, ready to be put on full feed when they begin production.
- g. The restricted or controlled feeding program for pullets will work best when they are housed in units of 100 to 125 pullets per house and where they have plenty of tender grazing crop available near the range shelters.
- h. Following are some of the grazing crops that give excellent grazing: Lespedeza, Bermuda grass, sweet Sudan grass, and Alyce clover.
- i. Pullets on a restricted feeding program should have plenty of granite grit feed at

free choice.

- j. Keep the grass on the range short to provide tender grazing for short grass has more food value. Avoid contaminated spots on the range.

## B. Laying flock

One hundred laying hens averaging 60% production through the year will require approximately 4 tons of feed for Leghorns and approximately 5 tons for meat type birds. This can be fed in the form of an all mash ration which does not require any additional grain feeding.

A grain mash system of feeding can also be used in which approximately equal parts of mash and grain are fed to the layers. This mash should be a highly fortified 20% protein mash.

The grain in the case of Leghorns can be made of approximately yellow corn chops, milo or wheat and heavy oats.

In the case of the heavy breeds the grain ration should be composed entirely of top quality heavy oats. Oat feeding will prevent excessive fattening of the meat type hens.

Proper feeding, management, good housing and equipment are essential for the laying flock. Adequate room and equipment should be provided. Crowding reduces egg producing efficiency and increases the hazards of disease and cannibalism. The poultry enterprise should be so located within the farmstead arrangement as to provide convenience, save steps, and insure efficiency in operation.

With good management in growing pullets it will cost somewhere between \$1.50 and \$2.25 per bird to put a pullet in the laying house. The varying in cost will depend on efficiency of management, disease control measures, and the amount of tender green feed available during the growing season.

A conservative estimate as to the profit per bird at the end of the laying season is \$2.00 to \$2.50 above all expenses. This again will depend on the efficiency of operations and the following of a good

management program.

1. For Comfortable Housing, Provide A Laying House With The Following Features:

- a. Allow at least 3 square feet of floor space for Leghorns and 4 square feet of floor space for the heavy breeds.
- b. The most economical house is a house 30 to 40 feet wide. The length will be determined by the number of pullets to be housed.
- c. Laying house should have floor ventilation at least 3 feet wide all way around the bottom of the house with adequate top ventilation.
- d. Dirt floor at least 12 inches higher than the outside ground with built up litter.
- e. 8 inches of roosting space per bird installed as dropping pits.
- f. Feed room conveniently located in the laying house.

2. Feeders, Waterers, Nests:

- a. Allow 35 to 40 feet of feeder space per 100 laying pullets.
- b. Use low type feeders to increase feed consumption.
- c. Provide abundance of clean fresh water. 100 pullets will consume 6 to 8 gallons of water a day. Use a two to two and one-half gallon water bucket or one 5-foot automatic water fountain for each 100 hens. Lack of water will decrease egg production.
- d. Provide for feeding oyster shell and grit.
- e. Allow 20 individual nests for each 100 hens.
- f. Add fresh mash daily and stir mash three or four times a day.

3. General Management:

- a. House pullets before they start laying, so they will get used to new houses and equipment.
- b. Pullets should be housed at 5 and one-half months of age and kept confined.
- c. House pullets according to maturity. Slow maturing pullets may be brought into production by separating them from the rest of the flock and encouraging greater mash consumption. These pullets are timid and won't eat when left with rest of flock.

- d. Feed a high quality laying mash (20% protein mash supplemented with grain. If the mash is 16 or 18% protein, it is an all-mash feed and no grain is to be fed.) Keep mash before the pullets at all times.
- e. Provide lights for increasing fall production so that there will be a total of 14 to 16 hours of light a day from the time the pullets are in 20% production. Provide at least one watt per bird from the start. Lights give the birds the go ahead signal. Lights should be spaced 10 feet apart and 5 to 6 feet from the floor.
- f. Replace the entire laying flock with pullets after the flock has been into production 12 to 15 months.
- g. Try to hold production to 50% or better by following a good culling program.
- h. Keep accurate records, summarize and analyze the results.

#### 4. Produce Maximum Number of Clean Eggs By:

- a. Confining the layers will aid in the production of clean top quality eggs.
- b. Using built up litter--remove only once a year.
- c. Gathering eggs 2 to 3 times a day or more if necessary.
- d. Darkening nests.
- e. Using clean nesting material.

#### 5. Handling of Eggs on Farm:

- a. Gather eggs in wire baskets and allow them to cool before packing.
- b. Put eggs under some kind of refrigeration immediately on gathering. Whatever you may use to keep them cool, the temperature should be under 60° F. Eggs freeze at 28° F. so don't put them in a freezer.
- c. Eggs storage room should be reasonably damp with a relative humidity of 70 to 75 degrees.
- d. Pack eggs with the little end down in clean cases with clean fillers that have been pre-cooled. This places the air



- cell on the top of the eggs which is the natural position for it.
- e. Eggs should be marketed two or three times a week.

## CHAPTER IV

### SUMMARY AND CONCLUSIONS

#### Introduction

The purpose of summarizing this study is to review information concerning the problem, sources of material, limitations, procedure, and data used in a manner that the reader might grasp, as near as possible, the general scope of the problem. It is not intended to introduce new information in this chapter.

The concluding statements are inferences or deductions based on ideas considered in this study. These conclusions were determined after a thorough sifting and evaluation of information related to the problem.

Recommendations for further study are presented by the writer as a result of observation of various problems arising during the research related to this problem and not dealt with herein. This suggested research should add to the effectiveness of present available material concerning production goals and should be a contribution to the field of vocational agriculture.

#### Summary

The establishment of suggested production goals for farm enterprises in the State of Louisiana was the purpose of this study. The sources of information were

related printed material and material collected during personal interviews with specialists of the Division of Agricultural Extension and personnel in the Division of Resident Instruction of the College of Agriculture at Louisiana State University. Data collected and presented in Chapter III deal with efficiency factors, efficiency standards, production goals, and approved practices most important for accomplishing the production goals. Due to the nature of the presentation of the data in Chapter III, it does not lend itself to summarization.

Summary statements may be made concerning the relationship of goals to the learning process, the relationship of goals to vocational agriculture, and the relationship of production goals to vocational agriculture. These statements are as follows:

1. Man is a goal seeking animal. The goal of the social process is to satisfy man's purposes. Goals direct the efforts of the learner and will provide a sense of direction and enthusiastic concern for some larger ends which stabilize one's life. It is generally agreed that the school is one of the primary institutions for facilitating and improving the social process. Schools are concerned with ultimate and immediate goals. There are few problems in the field of education that can be solved without

reference sooner or later to goals. A further relationship between goals and the learning process is that knowledge of success and error is significant only with reference to one's goals.

2. The relationship between goals and successful vocational agriculture is summed up by the following statement. A perspective of the overall aims and objectives of our program in vocational agriculture is important because all enterprises included in a student's farming program are to lead to the accomplishment of a common purpose -- that of establishment in farming. Determination of goals and objectives should be one of the first considerations of the teacher of agriculture in planning his work. This will provide a means for evaluating and improving instruction.
3. The following statements summarize the relationship of production goals to learning in vocational agriculture. A student is encouraged while planning his program of farming, to formulate long-time and yearly goals of achievement in terms of profits, labor income, increased net worth, change in farming status, and growth in ability to farm. In addition to

these goals, it is desirable for each boy to formulate specific achievement or production goals appropriate for each enterprise and in keeping with his conditions. Production goals should be attainable, not an ideal that is seldom reached. They should be changeable. The students should be caused to realize that they cannot attain high production goals unless they use approved practices. What practices the students should follow and how to carry them out become the basis of problem solving both in class and in supervision of the farming program. As the student, from day to day, is aware of how he is progressing toward his next goal, he is conscious of the need for learning how to carry out each practice that contributes to attaining his goal. As a result, study and learning become natural and inevitable.

### Conclusions

1. Our civilization of today is characterized by a changing nature and is dynamic to a greater degree than civilization in any preceding age. This phenomenon of change is characterized by an ever increasing momentum. The exact measurement of the degree of change in our way of living is an impractical task. During our

present age of scientific development, each new finding appears to dwarf preceding discoveries in its influence on society. The question is posed of whether change is constant.

Change is constant. Therefore, we must adapt our thinking to the concept that our environment is and will continue to become more complex as a result of the changing forces behind the advancement of our civilization.

2. For the consideration of educators and our people as a whole, the problem of adaptation of our educational system to meet this challenge of change presents itself. Shall our schools prepare our youth for adjustment to life in this altering age or shall we emphasize existing truths in school with the idea of controlling the future by a knowledge of the past?

Our educational system must prepare the student for adjustment in a modifying environment. This should not necessarily be done at the expense of neglecting the great stores of knowledge layed up by preceding generations. Rather, existing knowledge should be harnessed for present day use in our changing world. This harnessing of traditional subject matter for more effective use in its present day application may change its usual method of presentation, but should not decrease its value as a desirable area of study. Instead, there will be an increase in its effectiveness.

3. If our educational system is to undergo continuous changes in an effort to develop a desirable citizen that will fit best in our

society, means must be devised by which our school system will be given direction in adapting itself to meeting these needs.

School systems will follow the patterns set by the thinking of the administrators and teachers. These are the people charged with that responsibility of direction giving.

For our educational system to be successful in training citizens who have the ability to adapt themselves to our modifying conditions of life, its activities must be in accord with worthwhile goals. These goals must be the result of the best thinking among our leading educators who have as one of their educational aims adaptation to change. In service training and other means of professional improvement will be of tremendous value to teachers in cultivating worthwhile aims or goals of education.

4. Goals are not necessarily thought of in a broad sense. Their effective application may be best expressed as the expected result of a specific activity. Use of goals as a technique in the learning process has been of long standing an accepted practice of successful teachers.

Most authorities in the field of education, in an effort to cope with the new demands that this changing civilization has placed on our educational system, are presently more in agreement than ever before, that goals, both immediate and ultimate, are necessary supplements to the learning process.

5. After one has accepted the use of goals as means

of direction and also as a technique of instruction, then the problem of how goals should be stated arises. A third concept of the use of goals, that of serving as a means of measurement, further complicates the situation. With this compound idea of the use of goals, statements of goals must be carefully studied.

If goals are stated in terms of student accomplishment, they will be adaptable to any use that may be made of them by a student teacher.

6. Motivation and stimulation of interest in the learning process is a function of monumental importance to the successful teacher. Many techniques of motivation are presented. A method that is successful in one case may not work in another. No one technique will work in all cases; however, some have been found to be effective more often than others. Use of production goals has been presented as a means of increasing effectiveness of motivation and the development of interest among students in vocational agriculture.

Goals are the storehouse from which interests are taken by teachers to be used in creating a state of receptiveness in the minds of students. Use of production goals in studying vocational agriculture will stimulate immediate interests on the part of the student. This use will provide the student with an everyday reminder of the goals toward which



his efforts are directed.

7. A teacher of vocational agriculture is concerned with providing students with opportunities to learn. He strives to create learning situations whereby he might bring about worthwhile changes among his students. Many learning tools lend themselves for use by the teacher for this function. One of the most successful tools employed by teachers of vocational agriculture is the farming program of the student. Production goals are employed in carrying out the farming program.

The primary purpose of the farming program is to augment the classroom in making learning experiences complete. Use of production goals in conducting enterprises included in the farming program of the student will enhance the value of the farming program as an instrument of teaching and learning.

8. In the program of vocational agriculture, the farming program provides an opportunity for the student to test the degree with which he can apply the material that he has studied in class.

In our schools, there has long been a tendency to stop short of the application stage in the learning process and to evaluate our instruction without evidence of carry-over into the out-of-school world. The degree to which production goals are achieved by the students is indicative of the extent to which certain farming abilities have been developed and also indicates the carry-over potential.

9. In considering the problem of establishment of suggested production goals for farm enterprises, several factors need to be treated. The major factors are production potential, conservation of resources, and the point of highest profit combination.

The establishment of production goals in this study is based primarily on that factor of the point of highest profit combination with the idea that it would, in the majority of cases, be paralleled by the factor of conservation of natural resources. The factor of production potential was not a consideration in this study.

10. The suggested production goals presented herein are made on a statewide basis except where otherwise indicated. In a few cases where the production of a product was statewide and various soil types influenced the per acre production significantly, the state was divided into production areas. Some products are not grown commercially throughout the state. Due to this confinement of production, in these cases, only one area of production was treated. An example of this type of product is the strawberry, which is produced primarily in the southeastern portion of the state. These goals, whether based on a soil type area or on a statewide area, are directed toward the average

farmer in the given land area.

The suggested production goals presented in this study are intended to serve as guides for teachers and students of vocational agriculture in setting up individual production goals for the students' farm enterprises.

11. Availability of subject matter is an important ingredient to the success of a teacher in any field, particularly the teacher of vocational agriculture.

The availability of suggested production goals for farm enterprises taught in vocational agriculture in Louisiana will increase the use of production goals in this field. As a result, instruction in vocational agriculture will be made more effective.

#### Recommendations

The writer makes the following recommendations with respect to other studies needed concerning production goals.

- (1) It is indicated that investigation is needed in the frequency of use of calculated production goals in teaching vocational agriculture.
- (2) It is indicated that an individual study could be made on each farm enterprise setting up production goals based on a more extensive survey of local conditions, estimates, and records. The source for the data would be parish records, county agents, teachers of vocational agriculture and farmers.

- (3) It is indicated that investigation is needed concerning economic factors affecting establishment of production goals.

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## APPENDIX

SCHEDULES USED FOR COLLECTING DATA FROM SPECIALISTS  
DURING INTERVIEWS

INFORMATION

Enterprise

I. Introduction.

A. Economic importance to state.

Sources

B. Areas of production.

Sources

## II. Efficiency Standards and Production Goals

III. Approved Practices Recommended for Attainment of  
Production Goals.

## AUTOBIOGRAPHY

Thomas Jackson Stanly was born August 8, 1926, in Leesville, Louisiana. He attended grammar school and high school at Leesville High School, where he was graduated in 1942.

In June, 1942, he entered Louisiana State University, and completed his junior year before enlisting in the United States Navy on July 24, 1944. After twenty-three months service, sixteen of which were overseas, he was honorably discharged from the navy on May 29, 1946.

In June, 1946, the writer entered Louisiana State University and completed the requirements for a Bachelor of Science degree in agricultural education which he received in May, 1947. He re-entered Louisiana State University to do graduate work in June, 1947. At the same time, he was employed as Parish Supervisor of the Institutional on the Farm Training Program for veterans in West Baton Rouge Parish. He was graduated with the degree of Master of Science in agricultural education from Louisiana State University in August, 1948.

In September, 1948, the writer was employed as Head of the Department of Agriculture at Francis T. Nicholls Junior College of Louisiana State University. He holds this position at the present time. During the years 1951-1952, he was granted academic leave of absence during

which time he did work toward an advanced degree in the Department of Agricultural Education at Louisiana State University. In June of 1955, he was awarded sabbatical leave at which time he re-entered Louisiana State University in an effort to complete the work toward his doctorate. He will return to his present position of employment at the beginning of the spring semester, 1956.

The writer was married to Rebecca Brown Slack of Lake Charles, Louisiana, in December of 1948. They have two children: Rebecca Grace Stanly and Sarah Jane Stanly.

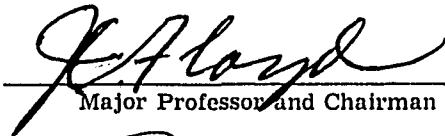
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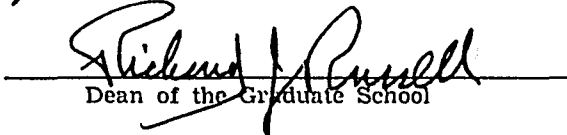
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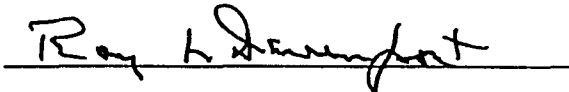
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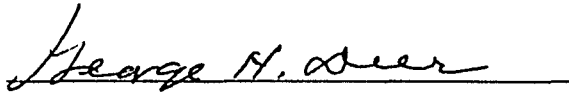
  
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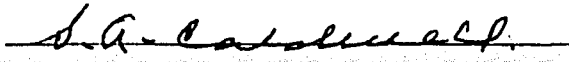
  
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